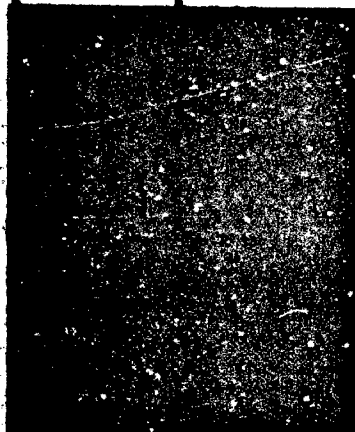


AD640130




Technical Report

AD 640 130

MECHANIZATION STUDY
OF THE VESIAC, BAMIRAC,
AND IRIA INFORMATION CENTERS,
UNIVERSITY OF MICHIGAN

BOOZ · ALLEN APPLIED RESEARCH INC.

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Technical Report

AD 640 130

MECHANIZATION STUDY
OF THE VESIAC, BAMIRAC,
AND IRIA INFORMATION CENTERS,
UNIVERSITY OF MICHIGAN

Submitted to

Defense Supply Agency
Defense Documentation Center
Cameron Station, Virginia

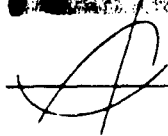
by

Booz, Allen Applied Research Inc.
4733 Bethesda Avenue
Bethesda, Maryland 20014

Under Contract No. DSA-7-15489

BAARINC Report No. 914-1-36

September 1966



BOOZ-ALLEN APPLIED RESEARCH INC.

WASHINGTON
CLEVELAND
CHICAGO
LOS ANGELES

680-55804005

ABSTRACT

Three information and analysis centers of the Institute of Science and Technology, University of Michigan, utilize the computer and EAM facilities of the Institute's Computation Department for retrieval of bibliographic references based upon the Computation Department's generalized retrieval system. The three centers are Infrared Information Analysis Center (IRIA), VELA Seismic Information Analysis Center (VESIAC), and Ballistic Missile Radiation Analysis Center (BAMIRAC). IRIA utilizes the mechanized retrieval program, which uses an IBM 1401 computer, to produce two listings. VESIAC is in the pilot stage of producing demand bibliographies using the mechanized information retrieval program. BAMIRAC utilizes an optional arrangement of manual, EAM, and mechanized techniques to provide demand bibliographies including abstracts. The development of a generalized retrieval program for all three centers has eliminated the need for the more costly process of maintaining a specialized program for each center. Because of center similarities, this general program fits each center's requirements without significant difficulty.

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A P P E N D I C E S

IRIA DOCUMENTS PROCESSING

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THE INSTITUTE OF SCIENCE AND TECHNOLOGY

IRIA FILE STRUCTURES

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AND INDEX RUNS

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1. SUMMARY

I. SUMMARY

Three information and analysis centers of the Institute of Science and Technology of the University of Michigan were studied and are discussed in this report. These centers are:

1. Infrared Information Analysis Center (IRIA)
2. VELA Seismic Information Analysis Center (VESIAC)
3. Ballistic Missile Radiation Analysis Center (BAMIRAC)

All three centers utilize the computer and EAM facilities of the Institute's Computation Department for their mechanized processes. These processes, while differing somewhat among the three centers, are confined to retrieval of bibliographic references based upon the Computation Department's generalized retrieval system.

The centers are summarized in the following paragraphs:

1. IRIA

The IRIA Center was established with tri-service sponsorship for the collection, analysis, and dissemination of information about infrared research and technology (0.7 to 200 micron region), with particular emphasis on military aspects. IRIA utilizes the mechanized retrieval program to produce annotated and demand bibliographies and uses EAM equipment to

roduce two listings: Contract Number vs. IRIA Number and AD
umber vs. IRIA Number. In addition, IRIA manually publishes
ate-of-the-art reports and the Proceedings of the Infrared Information
ymposia. Twelve thousand documents make up most of the IRIA
ollection, and these are increasing at a rate of about 2,000 documents
er year. Requests for information are received by telephone, letter,
r personal visit, visits averaging about seven per month. The services of
ie Center are available to all users who can establish the necessary
learance and need-to-know.

VESIAC

The mission of the VESIAC Center is to provide the Advanced
Research Projects Agency (ARPA) of DoD with a facility for the collection,
rocessing, analysis and dissemination of technical information relating
o underground nuclear test detection. The Center is in the pilot stage
f producing demand bibliographies using the mechanized information
etrieval program, and is manually producing a monthly acquisition list.
t also publishes and distributes information digests and news bulletins.
he collection currently consists of approximately 13,000 documents, of
hich about 3,000 have been keypunched to date for the information retrieval
rogram. The collection also includes about 50 periodicals in the field
f seismology. The entire collection is currently expanding at the rate of

about 2,000 documents a year. Information services are provided to the entire DoD community, within the restrictions of need-to-know and security. Requests for information may be received by telephone, letter, or personal visit. A lending service is also operating at the rate of 200 to 300 items monthly.

3. BAMIRAC

The function of the BAMIRAC Center is the collection, processing, analysis and dissemination of information on ballistic missiles and space vehicles, particularly concerning electromagnetic radiation. BAMIRAC's information function especially relates to defensive measures that may be taken against ballistic missiles and space vehicles. Its collection consists of about 8,500 documents; this increases at a rate of about 1,200 documents per year. (About twice as many documents are screened for relevance as are actually added to the collection.) The Center conducts its own investigations in its areas of interest as well as analyzing external information sources. It utilizes an optional arrangement of manual, EAM, and mechanized techniques in providing demand bibliographies (including abstracts). The Center also manually publishes its own technical reports, acquisition lists, and the Proceedings of the Anti-Missile Research Advisory Council. Its facilities and services are available to all users who possess the necessary clearance and have need-to-know.

II. MECHANIZATION

II. MECHANIZATION

1. CHRONOLOGY

(1) IRIA

This Center began as a small library in 1954. In the period 1957-1962, IRIA's bibliographic references were converted to McBee Keysort cards. In 1962, IRIA began its mechanization program primarily to reduce the two to three days time required to search its files. A reduction of this time to a matter of hours was to be a goal of the mechanization, the first step of which was the direct conversion of McBee cards to EAM punched cards. The existing format was maintained, but descriptors were added to permit a more rapid search. The conversion was completed in 1963, and the mechanized information retrieval system was then put into full operation. Since that time, the number of requests has increased by a factor of five, chiefly as a result of the speedier service.

(2) VESIAC

As a result of an increasing number of requests for demand bibliographies and other locally generated publications, VESIAC began, in the spring of 1965, to convert its retrieval system to the

generalized machine retrieval program of the Computation Department. The first step after reviewing the IRIA and BAMIRAC system was to develop the desired formats and to order the necessary EAM equipment. Key punching of bibliographies, data, and abstracts began in late May, and, by October, references for about 300 documents had been entered on the EAM cards. It is expected that the entire collection will be covered in this way by April 1967. The introduction of the Universal Decimal Classification system for subject classification is also anticipated.

(3) BAMIRAC

This Center began to consider the use of EAM methods for information retrieval in August 1959. The first system was planned for the IBM 709, but this was later abandoned because of format problems. By July 1961, the compilation of the Missile Résumé File was started, to meet a need to relate information in terms of specific missile firings. This file was keypunched on EAM cards, and a retrieval system using the IBM 1401 was developed. By June 1962, Résumé File mechanization was complete. By this time, the Keyword File had also been keypunched, and an IBM 083 sorter had been acquired for searching this file.

2. DESCRIPTION OF PROCESSES -- IRIA

(1) Input Procedures

1. When a new document is received, it is screened first for pertinency and then to determine whether it duplicates data already in the file.
2. The document is then logged in and assigned a sequential IRIA number.
3. Using the "Instructions for Using Information Punching Form" (see Appendix A-1), the indicated descriptive information is entered on the "IRIA Analysis Form " (see Appendix A-2), which is then attached to the document. The contract file is checked to determine if the document contract number (if any) is already listed. If it is, the IRIA number of the document is added to the contract file card. If not, a new card is prepared. Samples of the contract file cards are given in Appendix A-3.

A check is also made to determine if the document has already been reviewed by BAMIRAC.

4. Processed documents are then collected and delivered to an IRIA staff member for annotation. The annotation (a brief description of the document) is written on the back

of the Analysis Form.

5. Descriptor codes are assigned indicating category words, category numbers, report type, and an evaluation code.

The following extract from the document "Instructions to IRIA Reviewers", dated 14 April 1965, describes the use of these codes:

The quality of the report reviewing is the key to the retrieval system. Unless a report has been thoroughly described both by category words, category numbers, report type and evaluation code, retrieval becomes from difficult to impossible.

A comparison of two sample reviews is made here to illustrate how a poorly reviewed report can be lost in the retrieval system. This sample report is on missile nose cone re-entry data. The report type and evaluation code are disregarded to afford clarity.

	Category Numbers	Category Words
<u>Correct</u>	7.1.0 (IR general spectra)	EMSN (emission)
	2.1.0 (thermal sources)	SPTR (spectra)
	3.2.5 (target emission-missile)	NOCO (nose cone)
<u>Incorrect</u>	-----	-----
	2.1.0 (thermal sources)	-----
	3.2.5 (target emission-missile)	NOCO (nose cone)

In the incorrect example, the category numbers and category words are correct but the description is insufficient. Many people who are interested in document retrieval may just use one descriptor word or category number and expect that all pertinent documents will be printed out in an IBM search. For example, if the descriptor word spectra (SPTR) were used in this particular document, although it contains many spectral curves would not be retrieved unless it was correctly reviewed. In other words, it is almost impossible to find a document that has too many descriptor words or category numbers. Our major concern is whether we have left enough computer space for numbers and words to adequately describe all documents. Remember that not all infrared workers have the same interests and problems you have; be as objective as possible. It is probably easiest to fill out the analysis form from the bottom up. Specify a primary category number from the dictionary of category numbers. Then if the report warrants, secondary and tertiary numbers should be added. Then a report type, and finally an evaluation should be specified. The evaluation applies to the first category or the report as a whole. It does not mean that the report is necessarily e.g., "excellent" on the second category. Finally, three category words which are individual, unordered words may be specified. Before you are finished, you should look at the annotation to see if you have any changes to suggest.

6. The codes are entered on the Analysis Form using the "Instructions to Reviewers for Filling Out Information Punching Forms" shown in Appendix A-4. Examples of the codes used are given in Appendix A-5 and A-6.

7. The information on the form is then keypunched on EAM cards as indicated on the punching form. A sample card is shown in Appendix A-7 with the document title

typed on as a manual search aid. The annotation is keypunched on a separate set of up to 19 EAM cards using columns 7 through 51.

8. The cards are sorted, and a printout of the information is obtained. This is edited, and the corrected card data is placed on tape for retrieval. The cards are sent to the Computation Department once a month for a final listing for proofreading. The magnetic tape, which is a cumulative file of all of the cards, is updated every three months. A duplicate card is produced for a backup file.

(2) Outputs

IRIA produces two kinds of mechanized outputs: a classified quarterly annotated bibliography, and demand bibliographies. The latter generally do not contain the annotations. (For sample demand bibliography, see Appendix A-8.) Two types of listings are also produced with EAM equipment: Contract Number vs. IRIA Number and AD Number vs. IRIA Number.

3. DESCRIPTION OF PROCESSES -- VESIAC

(1) Input Procedures

1. When a new document is received, it is screened first

for pertinency and then to determine whether it duplicates data already in the file.

2. The document is then logged in and assigned a sequential VESIAC number.

3. At this point, the manual system calls for the entering of document data on four files of 3 x 5 cards and a strip card 'VU' file. The files are : Accession Number, Title, Author, Corporate Author, and Project Contract Number (VU).

4. Processed documents are then collected and delivered to a VESIAC staff member for abstract preparation or abstract enrichment (as required).

5. Descriptor codes are assigned, and the document is then stored by accession number.

6. In the developing mechanized system, the following EAM cards are prepared:

<u>Columns</u>	<u>Description</u>
<u>Card 1</u>	
1-6	VESIAC number
7-9	Secondary VESIAC number, if applicable
10-11	Card code
12-13	Card continuation number (if any)

<u>Columns</u>	<u>Description</u>
14-23	AD number
24-33	Report number
34-73	Primary and secondary contract numbers
75	Translation code when applicable
77	Thesis code, if document is thesis
78	Official-use-only code, when applicable
79-80	VU code

Card 2

14-53	First and second authors
60 -69	Date of document
75	Document code

Card 3

14-53	Third and fourth authors (when these exist)
-------	------------------------------------------------

Card 4

14-75	Corporate author and sponsor
-------	------------------------------

Columns

Description

Card 5

14-63

Remainder of information on
first corporate author

Cards 6 and 7

14-63

Identification of the second
or joint corporate author if
there is one.

(If the document being indexed is an article from a
journal, the name of the journal will be entered in the
place of the corporate author. ASTM STP No. 329
(CODEN) will be used as the thesaurus of code words
for journal titles.)

Cards 8-10

14-63

Title

Cards 11-2

14-43

Descriptors

Cards 22-35

14-72

Abstract

Columns

Description

Card 36

14-63

End of abstract

The cards are then sent to the Computation Department for updating the VESIAC file and for retrospective searches using the generalized program.

(2) Outputs

Demand bibliographies, currently without abstracts, are machine produced, based upon descriptor searches. A monthly accession list will also be machine produced, and plans are being made for a yearly cumulative accession list.

∴ DESCRIPTION OF PROCESSES -- BAMIRAC

(For flow chart of BAMIRAC documents processing, see Figure 1.)

(1) Input Procedures

1. When a document is received, it is screened for duplication and pertinency to the subject matter of the Center.

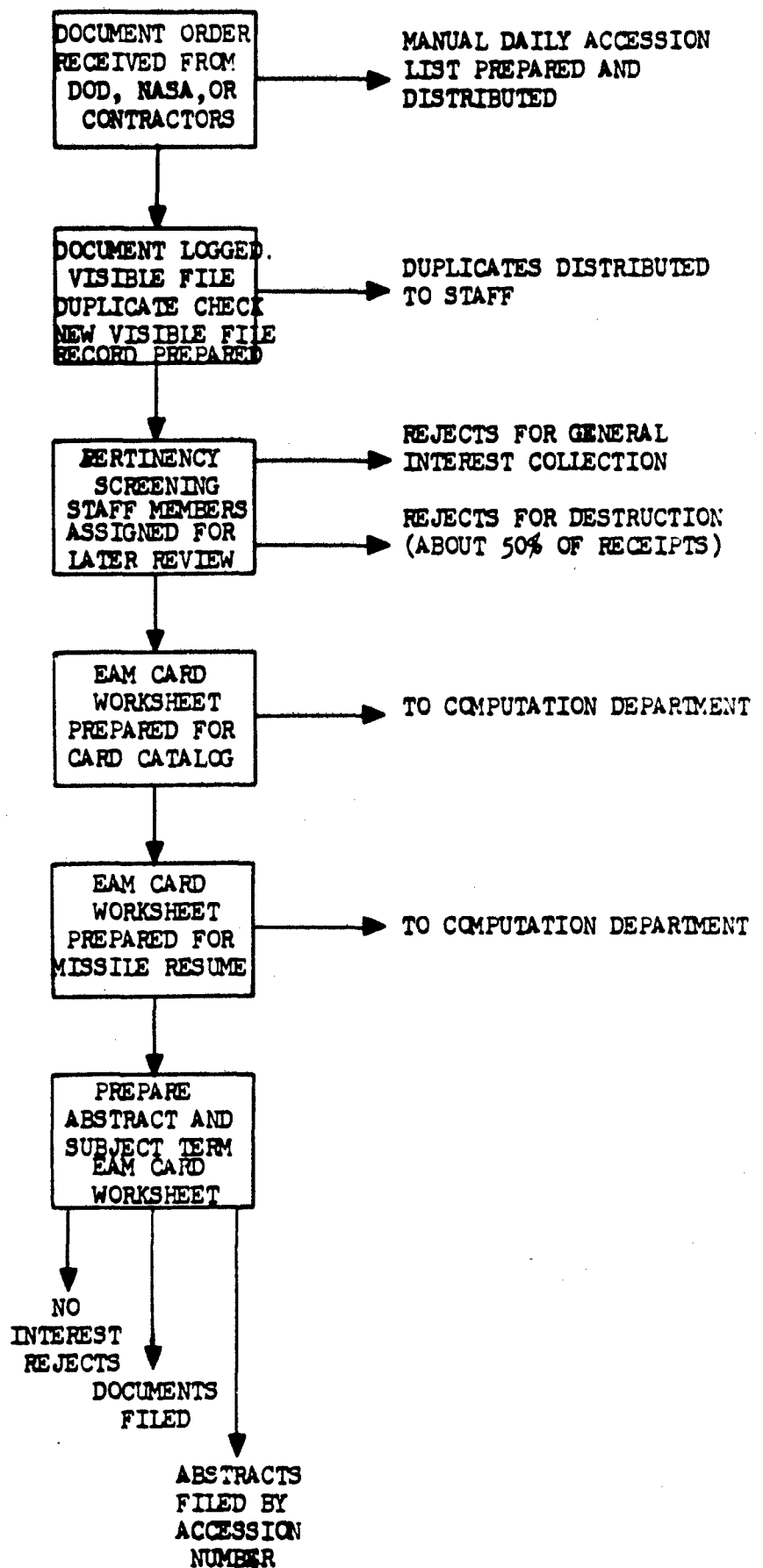


FIGURE 1

BAMIRAC Document Processing Flow Chart

2. If a decision is made to add it to the collection, an Accessions Information Form (see Appendix B-1) is prepared for it, showing the BAMIRAC (accession) number assigned to it, author, title, contractor, report number, date, sponsor, contract number, AD number, IRIA number (when applicable), and security classification. If the document relates to a missile firing, a Missile Résumé worksheet is prepared. The résumé is a compilation of available data obtained from measurements on a ballistic missile during a test flight. It is indexed by individual missile.

3. The Accessions Information Form and Missile Resume worksheet are then sent to the Computation Department for keypunching. Figure 2 illustrates the processing initiated by the Accessions Information Form. Two types of cards are punched from the Missile Résumé worksheet: a master card that identifies the missile firing, and detail cards that carry the firing date. (See Figure 3 for flow chart of Missile Résumé processing.)

4. The document is then reviewed by a technical staff member who prepares an abstract (see Appendix B-2 for abstract form) and indexes it with subject terms from the

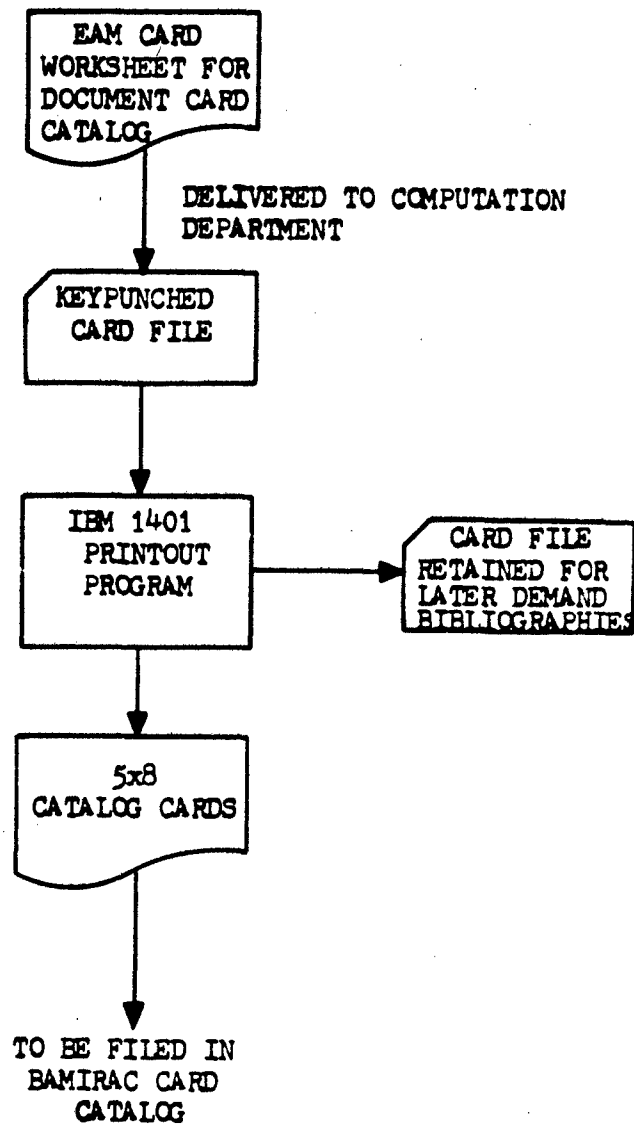


FIGURE 2
BAMIRAC Card Catalog Processing

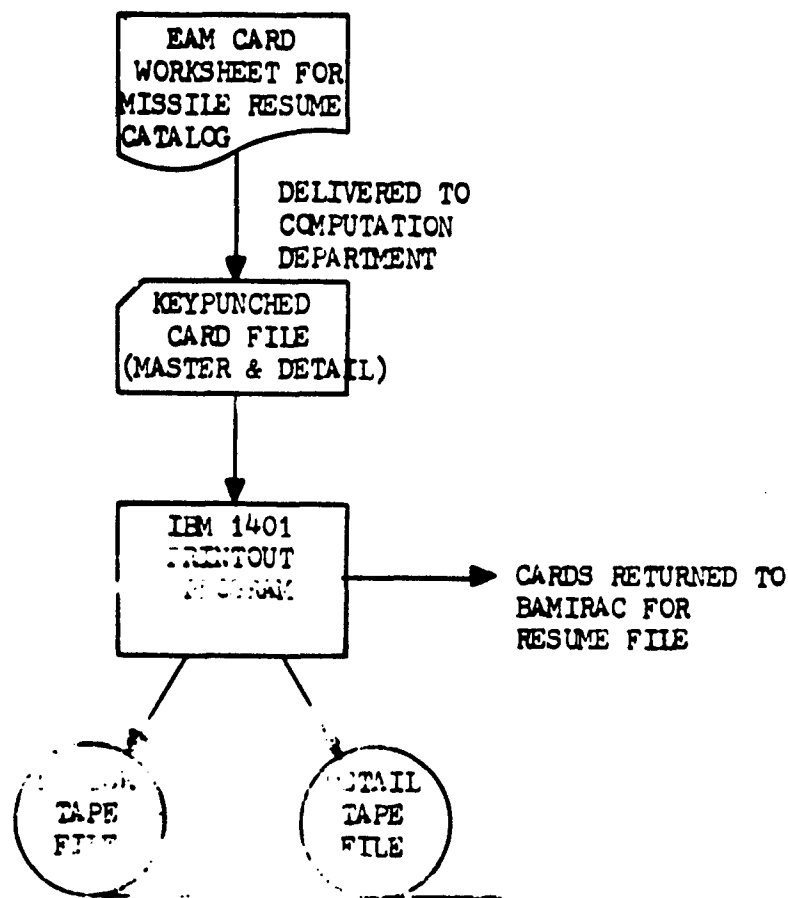


FIGURE 3

BAMIRAC Missile Résumé Processing

BAMIRAC keyword list form (see Appendix B-3). The keyword list form is also used as a worksheet for later keypunching of the EAM cards used for searches.

5. If the document does not relate to a missile firing, but it does contain data in the form of tables or curves, these data are keypunched on EAM cards for the Data File. In the case of curves, a special analog-to-digital device is utilized which automatically keypunches the value of a particular point on the curve to which its sensor is manually directed.

6. The abstracts are manually filed by accession (BAMIRAC) number. The keyword list form is kept for keypunching. The punched cards are filed in the Keyword File for later machine retrospective searches. The documents are shelved manually, by BAMIRAC number. Rejects are made available to the staff or are destroyed.

(2) Outputs

Demand bibliographies are produced by the generalized machine retrieval program if more than about 30 citations are involved. This is done by sorting the Keyword File for the desired terms and then printing out the corresponding accession numbers using the computer.

If less than 30 citations are involved, the bibliographic information is located instead in the manual card catalog, and the bibliography is completed as a manual operation. Appendix B-4 illustrates a catalog card.

In addition, the Missile Résumé File is printed out by the computer on demand.

Figure 4 depicts the overall BAMIRAC information retrieval system.

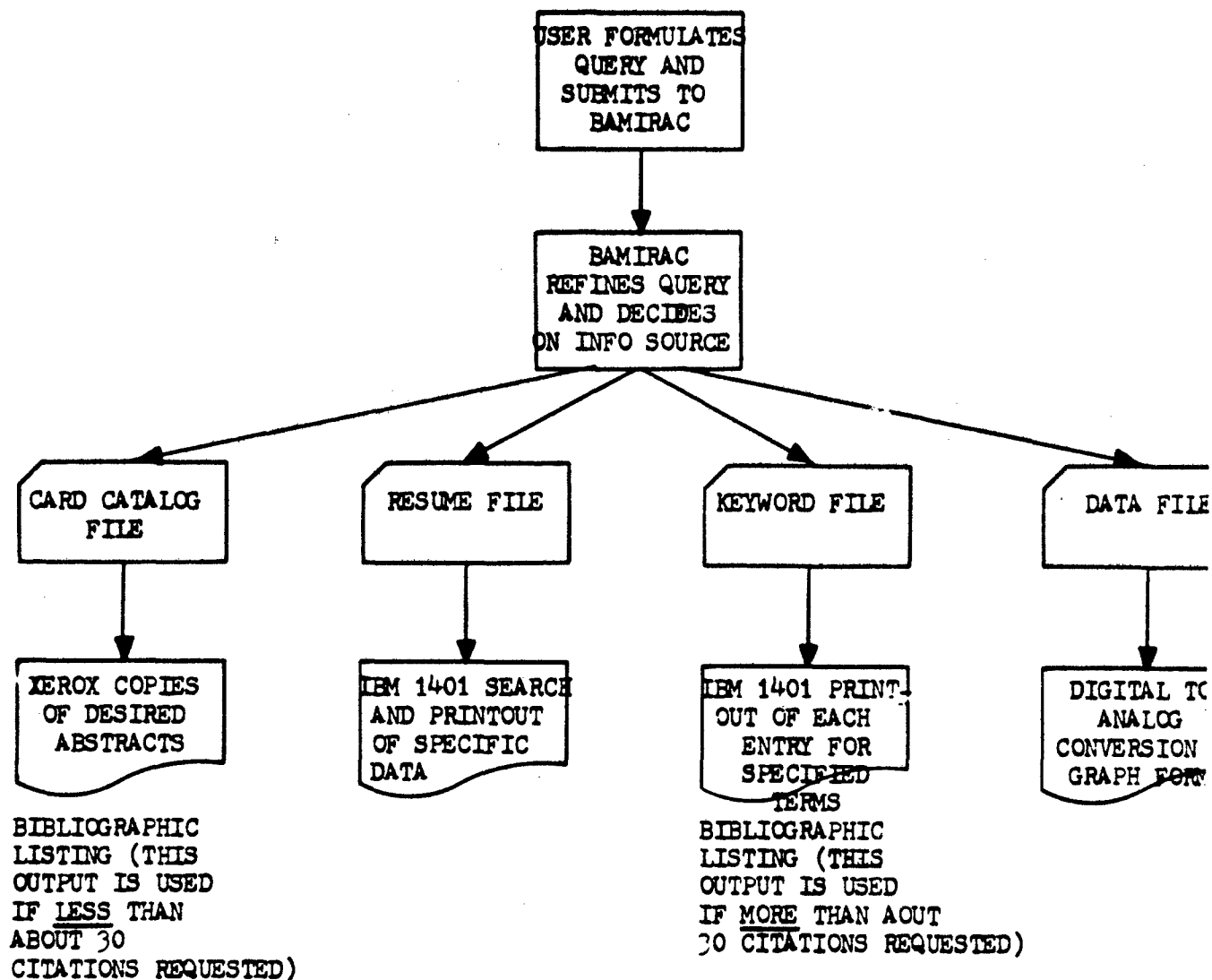


FIGURE 4
BAMIRAC Information Retrieval System

III. PROGRAM SYSTEM DATA

III. PROGRAM SYSTEM DATA

The generalized information retrieval program for the three centers is described in the document Information Retrieval at the Institute of Science and Technology (36943-68-T), dated October 1965 and issued by the Computation Department of the Willow Run Laboratories, Institute of Science and Technology, University of Michigan. A copy of this document is shown in Appendix C. Examples of file structures are given in Appendix D. Instructions for file updating runs are given in Appendix E, and annotated bibliography and index runs are discussed in Appendix F.

IV. EQUIPMENT, COSTS, AND EVALUATIONS

IV. EQUIPMENT, COSTS, AND EVALUATIONS

1. EQUIPMENT

IBM 1401 Computer

Central Processor with 4,000 character core storage

high-speed printer (600 lines per minute)

3 tape drives

2 disk pack drives

Programs are in Symbolic Programing System (SPS)

language or AUTOCODER

The 1401 computer is also used as peripheral equipment to the Computation Department's IBM 7090 computer.

2. COSTS AND TIME

(1) IRIA

The conversion of the system to mechanization was accomplished in one year. A man from the Computation Department was assigned to work on the project for the year. The total computer cost from July 1963 to July 1964, including the time of the Computation Department personnel, was \$27,000.

This encompassed card punching, file updating, retrieval, and an effort to machine-produce a cumulative, 10-year holdings list for FY 65.

The total budgeted for computer operation of IRIA in FY 1966 is \$13,000. This includes the IBM 1401 operations but excludes the keypunching activity of the IRIA staff. It is estimated that one keypunch operator at \$3 per hour, spending 75% of her time at keypunching, can do 90% of the keypunching required. The cost of running two tapes to update the file is \$50 every three months. Efficiency of activity, rather than cost reduction, was important in mechanizing the files ; IRIA anticipated and received an increase in actual cost.

(2) VESIAC

It is estimated that approximately \$250,000 will be required over a period of 18 months for developing and testing the system and keypunching records for 12,000 documents for the collection. Four VESIAC personnel will be involved, in addition to Computation Department personnel, but no estimate of man-hours is available.

(3) BAMIRAC

The BAMIRAC Information retrieval systems are still in a state of developing and haven't as yet matured sufficiently to accurately estimate the total cost.

3. FACILITIES' EVALUATIONS of SYSTEM

IRIA personnel consider that the operation of their center has been improved by mechanization. Last year, with mechanization, they were able to answer five times as many requests as before. Before going on full-time computer use, IRIA personnel required two to three days to prepare a bibliography for a visitor. The time now required averages one and one-half hours, and bibliographies have been produced in as short a time as 45 minutes.

The increase in response time is primarily due to the mechanized retrieval process which, while not reducing costs relative to the original manual system, is giving a comparable level of performance more cheaply than an equivalent manual system.

The development of a generalized retrieval program for all of the centers has eliminated the need for the more costly process of maintaining a specialized program for each center. Because of center similarities,

this general program fits each center's requirements without significant difficulty. Minor problems were identified in the area of input and output format, but these are being relieved with the development of a standard format and as the centers are assuming control over the EAM card files.

Experience has indicated better system performance when control of the EAM punched cards is maintained within a center. This has the double effect of reducing errors, especially those due to misunderstanding, and of giving a center's staff a better understanding of some of the mechanical problems of the mechanized process.

As ways of reducing response time to user's questions, the opinion has been expressed that electrical connection (such as teletype) to major remote users, as well as machine access to DDC's and selected other computer bases, would be highly significant. The latter arrangement would also help to insure that a center was getting the maximum of available items of interest, as well as simplifying the process of obtaining related material. It was further suggested that a DoD contractual requirement to route pertinent contractor reports to a center would be very helpful.

Users have objected to the difficulty in reading the computer printout of one center. This problem has been somewhat alleviated by darkening each title line by overprinting.

In order to economize on computer printing time, one center has applied the CODEN system to abbreviate journal names and corporate authors. (The CODEN system is discussed in CODEN for Periodical Titles, 1963, ASTM STP 329, American Society for Testing Materials.)

V. BIBLIOGRAPHY

BIBLIOGRAPHY

1. CODEN for Periodical Titles, 1963, ASTM STP 329, American Society for Testing Metals.
2. Information Retrieval at the Institute of Science and Technology, by F. L. Laustein, W. A. Wheaton, W. C. Johnson, D. B. Kirk, University of Michigan Willow Run Laboratories, Computation Department, Document No. 36943-68-T, October, 1965.

APPENDIX A

IRIA DOCUMENTS PROCESSING

INSTRUCTIONS FOR USING INFORMATION PUNCHING FORMIBM COLUMNSINSTRUCTIONS

- 1 - 23 Inclusive Leave blank. To be filled out at a later date by reviewers.
- 24 - 27 Inclusive
(Contractor Code) Insert four letter code name for contractor writing the report. (Use list of contractor codes, new words to be added as needed.)
Examples: Baird Atomic, Inc. - BASS
Univ. of Michigan - MICH
- 28 - 32 Inclusive
(Contract Number) Insert last group of digits of the contract number. If only four (4) numerals or less comprise the last group, insert zeros (0) in front of last, the group to bring total up to five (5) digits.
Examples: DA-44-012-sc-17892 becomes 17892
NOas 321-ord-6345 becomes 06345
- 33
(Contracting Dept.) Insert branch of government or private industry or university having prime interest for funding of the project.
Code:
0 Other Gov't. (e.g., AEC, Dept. of State, Dept. of Commerce)
1 Dept. of Army
2 Dept. of Navy
3 Dept. of Air Force
4 Private Industry or University
5 Foreign
- 34 - 37 Inclusive
(Sponsoring Agency) Insert the code name for the government agency, technical service, branch, or major laboratory having prime cognizance over the project. (Use code names)
Examples: Engineer Research and Development Lab.
ERDI
Wright Air Development Division
WADC

A-1
(Continued)

38 - 40 Inclusive
(Publication Date)

Insert month and year of publication. If only a report period is given, insert the termination a period ending date, (Note X-Nov., 1-Dec.)

Examples: 21 March 1952 becomes 352

Sept. 1951 becomes 951

Nov. 1949 becomes X49

Dec. 1954 becomes P54

Period 1 July 1953 - 1 October 1953, becomes 053

41 - 44 Inclusive

(Journal Reference)

Insert code work for journal in which report appears.

Example: Journal of the Optical Society of America JOSA

45 - 48 Inclusive

(First Author)

Insert initial of first name and the first three initials of the last name.

Examples: Bruce H. Billings BBIL

George A. Morton GMOR

G.B.B.M. Sutherland GSUT

49 - 61 Inclusive

(Abstract NO.)

Insert the letters and numerals of the abstract serial number, being certain to punch all nine (9) spaces. If less than (3) letters appear, insert (X) in front of serial letters, and if less than six (6) numerals appear insert zeros (0) in front of the numerals in order to be sure nine (9) spaces are used.

Examples: TIPCh1524

ATI836912

XAD002478

S54003956

62

(Language Code)

Insert one of the following codes if the document is written in a language other than English.
(If in English, leave this column blank).

CODE:

1 German
2 French
3 Russian

4 Italian
5 Spanish
6 Other

A-1
(Continued)

63 - 68 Inclusive
(IRIA Serial No.)

Insert the IRIA Serial Number which serves as a means of identifying the card, document, and information punching forms. Insert zeros (0) if less than six (6) numerals appear in the serial number.

Examples: 12846
00139

69 - 75 Inclusive
(BAMIRAC Serial No.)

Insert the BAMIRAC Serial Number which serves as a means of identifying the card, document, as a BAMIRAC document, cross referenced to IRIA. Use B for the first column of the code then use six (6) numerals, forming a code of 7 columns. Zeros are inserted if less than 6 numerals appear in the serial number.

Examples: B123789
B002657

76 - 79 Inclusive
(Reserved)

These columns are to be left blank for the present.

80
(Security Designation)

Insert one of the following codes according to the classification of the report.

CODE:

1. Unclassified (and open literature)
2. Confidential — Modified Handling Authorized
3. Confidential
4. Secret
5. Top Secret

NOTE: Not all items will be filled in on all cards. Hence, blank columns should be left where items do not apply. However, caution must be exercised in using the proper number of digits for each code, inserting zeros (0) and/or "X" in front of a group in order to build up to the proper total of each item.

ANALYSIS FORM

Tractor Code AJETTract Number 01461Department Service Code 1Sponsoring Agency OCRDDate of Publication 260Journal Author Code CLENAuthor Code Tract Number Language Code Serial Code 007129Service Priority Code 4Clerks Initials S.H.PH: PP Category Words GMSL-REENEvaluation Code 3Type of Report 4Category Number Category Number 9.2.0Category Number 3.2.5Reviewers Initials J.P.L.

3.2.5

A summary report on
the radiometric and
spectrographic measurements
of Atlas missiles during
re-entry. Test procedures
and results are presented

Hue

G.J.

3.2.5

FRONT

BACK

Sample Contract File Cards

CONTRACTOR - Wheeler Aircraft Corporation

CONTRACT NOS. - AF 15(840)-3906
AF 17(963)-4360

DA 99-078-ord-4567

CONTRACT NO. - AF 15(840)-3906

CONTRACTOR - Wheeler Aircraft Corporation

SPONSOR - Air Research and Development Command

TYPE OF WORK - Research and development on special aircraft

AUTOMATIC DISTRIBUTION _____

IRIA Number List

865L
8892
9012
9214
9654

INSTRUCTIONS TO REVIEWERS FOR FILLING OUT "INFORMATION PUNCHING FORMS"

IBM COLUMNS

INSTRUCTIONS

1 - 12

Note: Prior to filling in Columns 1 - 12 (Category Word Codes), it is recommended that items 14 - 23 (Category Numbers) be inserted.

Insert several "category words" not found under the numerical listing of Category Numbers, which describe the content of the report; not exceeding three (3) words. The words should be coded into four (4) letter codes and entered on the form in the space provided. If the numerical listing is adequate, this section may be left blank. See IRLA Word Codes.

13
(Evaluation Code)

Insert a code number indicating your opinion of the value of this report or paper being reviewed. This evaluation code does not refer to the quality of report writing but rather the value of the report to an infrared researcher. For example, a report on a new detector with increased sensitivity might be "must" reading for someone interested in detectors even though it is poorly written. Most of the reports will fall in the #3 code. Strive to be as unbiased as possible bearing in mind the purpose of the document is to serve someone else's needs. Also bear in mind that many users of the IRLA system will request only code #1 and #2 reports expecting that these reports will present new information.

CODE:

1 Excellent — A new and very noteworthy contribution. (Must reading for all researchers in the field.)

2 Very Good — (Showing marked improvement over previous work. Recommended for reading to many researchers.)

3 Average — A good report depicting some progress. (A large percentage of reports fall into this category.)

4 Fair — A report that depicts some progress but is very limited in value. (Might well be omitted by many researchers, except in special cases.)

5 Poor — A report presenting nothing new, being of little or no scientific value. (A waste of time for most researchers.)

A-4
(Continued)

14 (Type of Report)

Insert a code number (only one number) indicating the predominant classification of the report. Reports may fall into more than one classification type. If four (4) or more types are applicable, the "Omnibus" or "Code 8" should be used.

CODE:

- 1 - Military-sponsored "system" or staff study.
- 2 - General survey and/or summary of literature.
- 3 - Largely a Theoretical Analysis.
- 4 - Largely Laboratory experimental work.
- 5 - Prototype design and construction.
- 6 - Operational tests of equipment or operations analysis and research.
- 7 - Largely an administrative report.
- 8 - Omnibus, reports covering four or more of the above areas.
- 9 - Technical Manuals, Manuals of Operation; handbooks.
- 10 - Experimental-Theoretical Work.
- 11 - Intelligence Reports.

15 - 17
(3rd category No.)

Insert the category number of tertiary interest (if any) in accordance with the section numbers appearing in the Infrared Bibliography Outline. (e.g., 912 - Scanners).

18 - 20
(2nd category No.)

Insert the category number of secondary interest in the same manner as prescribed above. (e.g., 52 - Quantum Detectors).

21 - 23
(1st category No.)

Insert the category number of primary interest. (e.g., 21 - Thermal Sources).

Report Type Code Numbers

1. Military Sponsored System or Staff Study

Category includes a general evaluation of techniques, methods, and doctrine such as study of near infrared for ground combat or infrared techniques for reconnaissance systems.

2. General Survey or Summary of Literature

Bibliographies, extensive reference lists, etc., as well as reports such as the "Peoples Report" should be included in this type.

3. Largely a Theoretical Analysis

This type of report may be exclusively theory, but also includes reports in which the theory dominates the experimental work.

4. Largely Laboratory Experimental Work

This type of report includes test data, description of test procedure possibly equipment and results. It may include some theory where the theory supports the experiment rather than vice versa.

5. Prototype Design and Construction

This type of report describes the details of equipment particularly from the hardware standpoint rather than design fundamentals.

6. Operational Tests of Equipment of Operations Analysis and Research

This type of report includes "user tests" subsystem design and test field tests, etc.

A-4
(Continued)

7.	Largely and Administrative Report	<u>1.0.0</u>
	This type of report usually tells what is being done and how	1.1
	far they have proceeded rather than reporting the actual	1.2
	details.	
8.	Omnibus	1.4
		1.7
	For reports covering four or more areas.	<u>2.0.0</u>
		2.1
		2.2
9.	Instruction Manuals	2.3
		2.4
	Handbooks	2.5
		2.6
10.	Experimental-Theoretical Work	2.7
		2.8
	For reports where neither theory nor experiment dominate;	<u>2.9</u>
		3.0.0
	where they are completely complementary.	<u>3.1</u>
11.	Intelligence Reports	
	For reports which include information gathered from other	
	Nations through intelligence channels.	3.2
		3.3
		3.4
		<u>4.0.0</u>
		4.1
		4.2
		4.3
		4.4
		4.5
		4.6

ntal Physical	5.0.0 Detection Materials & Elements	7.5.4 Aldehydes
of Materials formation	5.1.0 Thermal Detectors	7.5.5 Acids
ng	5.1.1 Bolometers	7.5.6 Others
State	5.1.2 Thermocouples & Thermopiles	7.6.0 H-C-N Compounds
aceous	5.1.3 Expansion	7.6.1 Aliphatic Amines
phies	5.1.4 Dielectric	7.6.2 Heterocyclics
	5.1.5 Evaporation or Conduction	7.6.3 Others
	5.1.6 Absorption Edge	7.7.0 H-C-O-N Compounds
	5.1.7 Luminescent	7.7.1 Amides
	5.2.0 Quantum Detectors	7.7.2 Others
escence	5.2.1 Photoemissive	7.8.0 Plastics
ence	5.2.2 Photoconductive	7.9.0 Fluorocarbons
s	5.2.3 Photovoltaic	7.11.0 Silicones
Beam	5.2.4 Luminescent	8.0.0 Infrared in Science
1	5.2.5 Image Tubes	8.1.0 Astronomy and Geophysics
large	5.2.6 Photoelectromagnetic	8.2.0 Physics
	5.3.0 Photographic	8.3.0 Chemistry
	5.4.0 Optical Pumps	8.4.0 Meteorology
	5.5.0 Microwave Techniques	9.0.0 Military Technology
&	6.0.0 Laboratory Components & Techniques	9.1.0 Auxiliary Components
ision	6.1.0 Optical Components	9.1.1 Irdomes
ackgrounds	6.1.1 Prisms	9.1.2 Scanners
	6.1.2 Filters and Windows	9.1.3 Data Processing
n	6.1.3 Mirrors	9.1.4 Display
	6.1.4 Lenses	9.1.5 Circuitry
ounds seen	6.1.5 Gratings	9.1.6 Optics
atellite altitude	6.2.0 Optical Equipment	9.1.7 Reticles
de" targets	6.2.1 Spectrometers	9.1.8 Coolers
ig	6.2.2 Monochromators	9.2.0 Systems
inel	6.2.3 Interferometers	9.2.1 Reconnaissance
e Vehicles	6.2.4 Polarizers	9.2.2 Recognition & Detection, Mapping
ft	6.2.5 Radiometers	9.2.3 Navigation
es	6.3.0 Electrical Equipment	9.2.4 Search and Warning
Surface	6.3.1 Simulators	9.2.5 Communication
es	6.4.0 Electrical Components	9.2.6 Tracking & Fire Control
Vehicles	6.4.1 Amplifiers	9.2.7 Homing
re	6.4.2 Displays	9.2.8 Bombing
ic Bodies	6.4.3 Servo Systems	9.2.9 Ranging
	6.4.4 Modulation Systems	9.3.0 Aerial Countermeasures
erties	6.4.5 Electronics & Electric Filters	9.3.1 Active
	7.0.0 Infrared Spectra	9.3.2 Passive
theory	7.1.0 General	9.4.0 Ground-Based Countermeasures
	7.2.0 Elements	9.4.1 Active
	7.3.0 Inorganic	9.4.2 Passive
	7.4.0 H-C Compounds	9.5.0 Detection of Gases & Vapors
l Solids	7.4.1 Aliphatics	10.0.0 Infrared in Arts, Medicine & Industry
s	7.4.2 Aromatics	10.1.0 Graphic
ls	7.5.0 H-C-O Compounds	10.2.0 Criminology & guerrilla activities
cts	7.5.1 Alcohols	10.3.0 Plant Protection
s	7.5.2 Esters	10.4.0 Miscellaneous Industrial Uses
ons	7.5.3 Ketones	10.5.0 Agriculture
		10.6.0 Food Industry
		10.7.0 Medicine
		10.8.0 Transportation

DICTIONARY OF CODE WORDSA

ASER	<u>Aberration</u> - to discuss the theory and phenomena in various optical systems. See also KELS, MAKS, RATR, ASPH.
AESP	<u>Absorption</u> - for substances other than the atmosphere, CO ₂ , H ₂ O, Ozone when absorption is discussed. See also EMSN.
ACTV	<u>Active</u> - for systems which include their own source, e.g. the sniperscope. See also BENC, DRVG.
ADPX	<u>Ammonium dihydrogen phosphate.</u>
AERH	<u>Aerodynamic Heating</u>
AGCL	<u>Silver Chloride</u> - See also ASTS.
ALNI	<u>Aluminum Nickel.</u>
ALOO	<u>Alumina</u>
ALZZ	<u>Aluminum.</u>
AMMO	<u>Amplitude Modulation.</u>
AMPL	<u>Amplifier</u> - light, electronic, magnetic, etc.
ARTC	<u>Artic</u> - for tests on equipment, measurements and operations in this region.
ASPH	<u>Aspheric</u> - to describe optical surfaces. See also ASPH, KELS, MAKS, RATR.
ASTS	<u>Arsenic Trisulfide</u> - See also ACCL, GLAS.
ATAR	<u>Air-to-Air</u> - for all equipments which have this function (they may be test gear, and they may also be air-to-ground as well). Ground includes the ocean for these purposes. See also ATGD.
ATGD	<u>Air-to-Ground</u> - see definition air-to-air.
ATMO	<u>Atmosphere</u>
ATTD	<u>Attitude, Position.</u>

SAMPLE IRIA DEMAND BIBLIOGRAPHY

B00006

TEDRICK, R.N.

CLASSIFIED TITLE (SECRET)

U.S. ARMY WHITE SANDS SIGNAL AGENCY

SOTIM PROGRESS REPORT 7

U. S. ARMY SIGNAL CORPS

IN - HOUSE

OCT. 1957

B00021

ZISSIS, G.

LAROCCA, A.

HALL, F.J.

LIVISAY, J.

MORGAN, J.

INFRARED MEASUREMENTS OF BALLISTIC MISSILES DURING IRMP
1958 (SECRET)

UNIVERSITY OF MICHIGAN

2900 10-T

ARMY SIGNAL CORPS

JUNE 1959

DA-36-039-SC-52654

B00046

AD 152 442

FLAMMER, C.

BACK-SCATTERING CROSS SECTIONS OF MISSILE TRAILS, THE
(UNCLASSIFIED)

STANFORD RESEARCH INSTITUTE

TR-64, AFCRC-TN-58-190.

JUNE 1958

AIR FORCE CAMBRIDGE RES. CENTER AF 19(604)03458

B00113

AD 160 756

ESTOQUE, M.

VENTING OF HOT GASES THROUGH TEMPERATURE INVERSIONS
(UNCLASSIFIED)

GEOPHYSICS RESEARCH DIRECTORATE

AFCRC-TN-58-623 GRD RESEARCH NOTE NO. 3

DEC. 1958

AIR FORCE CAMBRIDGE RES. CENTER IN - HOUSE

B00133

AD 302 207

STUDY OF RADAR BEAM ATTENUATION IN ROCKET EXHAUST GASES
(CONFIDENTIAL)

STANFORD RESEARCH INSTITUTE

QUARTERLY STATUS REPORT 5

MAY 1957

AIR RESEARCH AND DEV. COMMAND

AF 04(645)00066

B00188

AD 114 176

KELLOGG, W.

PASSMAN, S.

INFRARED TECHNIQUES APPLIED TO THE DETECTION AND
INTERCEPTION OF INTERCONTINENTAL BALLISTIC MISSILES
(SECRET)

RAND CORPORATION

RM-1572

OCT. 1955

APPENDIX B

BAMIRAC DOCUMENTS PROCESSING

B-1
ACCESSIONS INFORMATION FORM

BAMIRAC NO. _____

AUTHOR (S) _____

TITLE IN FULL _____

CONTRACTOR _____

REPORT NO. OR VOLUME NO. _____

DATE OF PUBLICATION _____

SPONSOR (S) _____

CONTRACT NO. (S) _____

AD or ATI NO. _____

IRIA NO. _____

SECURITY CLASSIFICATION _____

MISC. INFORMATION _____

B-2

BAMIRAC RADIATION DATA LIBRARY

Abstract

REVIEWER _____

BAMIRAC NUMBER _____

DATE OF REVIEW _____

SECURITY CLASSIFICATION
OF THE ABSTRACT _____

EVALUATION CODE _____

ABSTRACT:

BAMIRAC KEY WORD LIST

<u>1. TYPE OR REPORT</u>	<u>10. PHASE</u>	<u>20. GENERAL SUBJECT</u>	<u>30. AREA</u>	<u>40. MODIFIER</u>
0 REVIEW	0 LAUNCH	0 VEHICLE CHAR.	0 ULTRAVIOLET	0 SPECIES
1 THEORETICAL	1 MIDCOURSE	1 RESUME DATA	1 VISIBLE	1 SOLID MATERIALS
2 LABORATORY	2 REENTRY	2 ATMOSPHERE	2 INFRARED	2 PROCESSES
3 FIELD		3 ABM, PEN. AIDS	3 ENVIRONS	3 THERMODYNAMICS
4 PROGRESS		4 INSTRUMENTATION	4 WAKE	4 BODY DYNAMICS
5 TEST		5 RADAR	5 DECOY	5 SPECTRAL RESOL.
6 SYMPOSIUM		6 FLUID DYNAMICS		6 SPATIAL RESOL.
7 SPECS		7 ENERGY TRANSFER		7 GROUND-BASED
8 BIBLIOGRAPHY		8 CHEMISTRY		8 AIRBORNE
9 SYSTEMS		9 PHYSICS		

B-3

RARE TERMS

PROJECT NAME _____
 BOOSTER _____
 NOSE CONE _____
 DECOY _____
 OTHER _____

DOCUMENT IDENTIFICATION

PUB. DATE MO. YR.
 (e.g. 9 63) _____
 CORP. AUTHOR _____
 (leave blank)
 BAMIRAC NUMBER _____

B-4

B 9450

FLIGHT EVALUATION REPORT FOR WAC-2 PE-ENTRY VEHICLE #70

ATLAS F MISSILE NO. 137 APR TEST 575 (SECRET)

GENERAL ELECTRIC COMPANY, RSD

PHILADELPHIA, PENNSYLVANIA

REPORT 64SD5C44

SEPT. 1964

PALLISTIC SYSTEMS DIVISION

AF 04(694)00350

Sample 5x8 Catalog Card

APPENDIX C

**GENERALIZED INFORMATION RETRIEVAL
PROGRAM FOR THE THREE CENTERS**

36943-68-T

INFORMATION RETRIEVAL AT THE INSTITUTE OF SCIENCE AND TECHNOLOGY

F. L. LAUNSTEIN
W. A. WHEATON
W. C. JOHNSON
D. B. KIRK

October 1965

Computation Department
Willow Run Laboratories
THE INSTITUTE OF SCIENCE AND TECHNOLOGY
THE UNIVERSITY OF MICHIGAN
Ann Arbor, Michigan

WILLOW RUN LABORATORIES

ACKNOWLEDGMENTS

Acknowledgment must be made to Mr. D. M. Sinnett, currently with the Detroit Memorial Hospital, who assisted in the preparation of many of the subroutines used in this program.

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ABSTRACT

Information Retrieval at a particular computing installation is a function of need, cost, and machine availability. Small machines not designed primarily for mathematical calculations can, however, effectively perform the basic operations required by a retrieval system, namely, the selection, arrangement, and printing of data. A system has been designed at The University of Michigan in which the retrieval request provides complete specifications for each of the above topics, and thus permits a variety of outputs to be prepared without the intervention of programmers and specialized programming. Although the system is described in general terms, it has been programmed for an IBM 1401 and is operating quite successfully. A complete description of the methods of preparation and retrieval of data is presented, including an illustrative example.

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INFORMATION RETRIEVAL AT THE INSTITUTE OF SCIENCE AND TECHNOLOGY

1 INTRODUCTION

Information retrieval as a data-processing function, using high-speed computers, has received much attention during the last few years. Many different techniques have been developed for storing, searching, sorting, and printing information. In fact, there are probably as many different programs to perform a particular retrieval function as there are different computing installations in the country. Items such as need, cost, the type of machine available for use, and the ultimate value of the output, all determine the type of retrieval system developed. Ours evolved from the needs of our libraries at IST.

The system developed at the Willow Run Laboratories of The University of Michigan's Institute of Science and Technology is described in general terms and is, therefore, machine independent. It has, however, been programmed for an IBM 1401 and is satisfactorily fulfilling our requirements. In describing the system, references to specific card formats may be made in order to clarify how some fundamental parameters are read by the program. A simple example, illustrating the features of the system, and showing how these parameters are used, is included at the end of the report.

Any information retrieval system must contain a provision for storing information and recalling it in some manner. The system used here is designed for retrieving information from magnetic tape that has been prepared from punch cards. An outline of the system can be separated into the categories listed below (with the section number in which each is discussed):

- 2. Preparation {
 - 2.1. Preparation of the detail punch cards from a basic source document
 - 2.2. Preparation of a tape from the cards
- 3. Retrieval {
 - 3.1. Selection of information from the tape
 - 3.2. Arrangement of this information in some order
 - 3.3. Printing the retrieved information
- 4. File Maintenance

Each of these categories will be fully discussed in the following pages.

2 PREPARATION

2.1. PREPARATION OF THE DETAIL PUNCH CARDS FROM A BASIC SOURCE DOCUMENT

The creation of the cards from a basic source document is the most important phase of the entire system. If a new library is being established, close collaboration with someone familiar with the information retrieval system should be maintained in order to minimize subsequent data

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processing problems. What information is required and the number of locations that are to be allocated to the data must be specified. A fundamental unit or "case" must be defined so that one unit may be distinguished from another. Each unit, or even individual subunits, may require more than one punch card. Basic definitions must be made to identify the information in the cards:

- (A) A "case" or unit code.
- (B) A card code to identify the information in specific fields within that detail card.
- (C) A provision for more than one detail card (continuation cards) for a particular card code. Continuation cards are commonly encountered when punching titles or abstracts from the document.

It is important to include all relevant information for the requirements of the user. Too often, however, additional data are included merely because they "might be useful." Such additions will result in greater expense, both in data handling and in machine usage. On the other hand, the omission of a piece of data, or lack of specification may cause substantial re-punching or reprogramming. Careful planning is extremely important before the cards are prepared. The trite statement that the output will be no better than the input still holds.

2.2. PREPARATION OF A TAPE FROM THE CARDS

The transition from cards to tape is accomplished by means of a File Conversion Program. Control cards which provide a numerical identification of the information on the detail cards are first prepared. The conversion program, followed by the control cards and detail cards, then prepares the tape on which the information is stored. Field codes are assigned to each category of interest which appear on the detail cards. A separate record will be prepared for each "case." Four types of control cards that will provide identification of the information on the detail cards are:

- (A) Identification Card, containing
 1. The date of tape preparation
 2. Identification for checking purposes
- (B) Group Control Identification, containing
 1. Starting position of "case" field on the detail cards
 2. Length of "case" field
 3. Starting position of card type field on the detail cards
 4. Length of card type field

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(C) Field Description Cards (one for each field), containing

1. Card type code on the detail cards
2. A field code number to be assigned
3. Starting position of the field on the detail card
4. Length of the field
5. An indication of whether continuation cards are permitted for this field

(D) A card to signal the end of the control group

The number of the tape, date prepared, samples of the card input, lists of field codes used, and the items defined by the field codes should be kept by the user for reference purposes.

3

RETRIEVAL

3.1. THE SELECTION OF INFORMATION FROM THE TAPE

Many techniques can be devised for extracting information from the data tape. The technique finally used was decided upon after substantial experimentation and numerous trial runs. A decision is made whether or not to select the entire record (unit) based upon a combination of one or more request factors, involving logical AND, OR search conditions. If the record is selected, it is copied onto another tape in its present form; if not, the record is simply bypassed on the search run.

The specifications for selecting records are made up from the following five items:

- (A) Field code or codes in the record
- (B) Logical operations of "AND," "OR," "NOT"
- (C) A comparison of "GREATER THAN," "EQUAL TO," or "LESS THAN"
- (D) An argument associated with a particular field code
- (E) A signal to indicate the termination of the request

In addition, provisions are available for searching an entire field, character by character, or in blocks, if desired. The symbol definitions are as follows:

<u>Symbol</u>	<u>Definition</u>
A	Logical AND
o (letter)	Logical OR
N	NOT
M	Symbol for search by blocks in a particular field. (Total field must be an integral multiple of the block size.)

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<u>Symbol</u>	<u>Definition</u>
S	Symbol for character string search throughout entire field (Argument must be less than or equal to the field size).
G	GREATER THAN
L	LESS THAN
B	NO SUCH FIELD

In creating search requests, the EQUAL option is always assumed. Various combinations of the operational symbols may be developed. In conjunction with the operation, field code, and comparison symbols, an argument is necessary. Let us assume that a \$ is used to divide the operational symbol(s) and the argument. Then the following request:

Example 1:

Field Code and Argument

\$05\$123\$

might imply: Select all records that have 123 in field code 05.

Example 2:

\$05\$123\$

\$014\$456\$

might request: Select all records with 123 in field code 05 OR 456 in field code 14.

Example 3:

\$05\$123\$

\$AN13L\$45\$

\$AS12\$_DOG_\$ (where _ represents a blank column on the request card)

might request: Select all records that have (1) 123 in field code 05 (2) AND NOT those with field code 13 LESS than 45, (3) AND those with _DOG_ any place in field code 12. Thus, a case with 123 in field code 05, 50 in field code 13, and _DOG_ anywhere in field code 12 would be selected: those without _DOG_ in code 12, OR ≤ 44 in code 13, OR without 123 in code 05 would be rejected. If blanks had not been used to separate the argument DOG, a word such as DOGMATIC would satisfy the third condition.

The operator field, which is made up of operation symbols and a field code, is thus of variable length and is developed from left to right. A table of various combinations and definitions is shown using field code 12 as an example.

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<u>Operator</u>	<u>Definition</u>
12*	Select records with field code 12 equal to the argument . . .
A12	AND the argument of field code 12 equal to . . .
AN12	AND the argument of field code 12 Not equal to . . .
AN12G	AND the argument of field code 12 Not greater than . . .
A12L	AND the argument of field code 12 less than . . .
A12G	AND the argument of field code 12 greater than . . .
A12B	AND field code 12 missing
AS12	AND search the entire field for . . .
AM12	AND block search the entire field for . . .

(A similar set may be obtained by replacing A with ϕ in the operator and the AND with OR in the definition.)

The general form of the search operator will be:

$\left(\begin{smallmatrix} A \\ \phi \end{smallmatrix}\right) (N) \left(\begin{smallmatrix} S \\ M \end{smallmatrix}\right) FC \left(\begin{smallmatrix} G \\ L \end{smallmatrix}\right)$ where the letters FC represent the field code and the letters enclosed by () are optional. A related argument, of course, is also required.

Arguments connected by the OR operator may be thought of as enclosed by parentheses. For example, a request of (W or X) and (Y or Z), will choose the following combinations: (W, Y), (W, Z), (X, Y), or (X, Z). It would be written (symbolically) \$W\$ ϕ X\$A Y\$ ϕ Z\$, where W, X, Y, and Z represent field codes and arguments are deleted for simplicity.

A restriction to the program is that G or L may not follow the field code when the operators S or M are used.

Finally, a symbol such as END is needed to signal the end of the cards associated with the search request.

3.1.1 THE SRCH CARD. Cards punched SRCH in column 1-4 and blank in column 5 are the search input to the retrieval program. They govern the selection of the desired records from the data tape. Since the field code-operator symbol field is of variable length (from 2 to 5 characters), and the argument field is also of variable length, the division of these fields is indicated by the \$ delimiter as illustrated in the past examples. Each card will start with a \$ in column 6 and must terminate with a \$ on or before column 72. Since Blank columns are equally as important as non-blanks in the argument field, the request must be carefully prepared. To

*The A or ϕ may be omitted on the first operator, if desired.

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reduce the number of cards required, many request options may be placed on one card. As an illustration, the actual input card for example 3, above, would appear as:

```
SRCH_$05$123$AN13L$45$AS12$_DOG_$  
SRCH_END
```

Notice that the field code must precede its related argument. For ease in reading, it is suggested that a complete argument terminate a card.

3.2. THE ARRANGEMENT OF THIS INFORMATION IN SOME ORDER

After the information has been selected, an ordering or sort is then performed. Up to ten field codes may be nested for this operation if desired. Two cards are required for this phase: (1) the SORT card, indicating how the sort is to be completed, and (2) the ALSO card, indicating what information is to be carried.

3.2.1. THE SORT CARD

<u>Columns</u>	<u>Contents</u>
1-4	SORT
5	Blank
6-7	(1) Primary (or most significant) sort field code Position of first (left-most) character to be sorted
8-9	
10-11	
12-13	Secondary field code
14-15	(2) Starting position desired for sort (left-most)
16-17	
	Number of characters sorted

The remainder of the card follows the same pattern (6 characters per field sorted) down to the least significant field.

The first blank after column 11 will terminate the sorting specifications.

3.2.2. THE ALSO CARD. In addition to the fields carried in the SORT card, other fields not involved in the ordering (sometimes the entire record) are usually required for the print-out. This is accomplished by means of the ALSO card. Its specifications are quite simple:

<u>Columns</u>	<u>Information</u>
1-4	ALSO
5	Blank
6-7	Field code (1) to be carried

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<u>Columns</u>	<u>Information</u>
8-9	Field code (2) be carried
.	
.	
.	
70-71	Field code (33) to be carried

The first blank following column 5 terminates this request card. This option is most useful when only two or three additional field codes are to be carried. If the entire record is to be selected, the letters ALL should be written in columns 6-8 of the ALSO card.

3.3. PRINTING THE RETRIEVED INFORMATION

The specifications for the final printed output allow the user to specify what information is to be printed, where it is to be printed, and also provide controls for appropriate spacing, which are necessary to provide a legible result. Provisions are made for inserting a heading for the entire job, as well as a heading for each page of output, if that is desired. Parameters related to spacing are also described.

3.3.1. THE PRNT CARD. This is a Print Control Card that defines the right margin of the page, indicates whether the decision to go to a new page is based on a single line or entire record, and governs spacing between records. In addition, 61 spaces are provided for identification of the job being printed. Specifications are

<u>Columns</u>	<u>Description</u>
1-4	PRNT
5	Blank
6-8	Right-hand margin
9	Is new page based on a <u>line</u> near the bottom of the page? (Y - yes; N - no)
10	Is new page based on a <u>record</u> near the bottom of the page? (Y - yes; N - no)
11	What spacing is to <u>follow</u> the printing of the last line of a record? (J - 1 space; K - 2 spaces; 1 - new page; blank - no spacing)
12-72	Job description

3.3.2. THE HEAD CARDS. The page heading card(s) will supply information to be printed at the top of each page of the listing. It is identified by the letters HEAD punched in columns 1-4 of every card required. If no heading is desired at the top of each page, no cards with HEAD in columns 1-4 need be prepared, and the control cards will go directly from the SORT control to the LIST control.

WILLOW RUN LABORATORIES

There are fundamentally four pieces of information required for each item, with the exception of descriptive information to be placed in the body of the printout. Except for the identifying letters in columns 1-4, this information is identical to the requirements for printing the body of the report (see LIST below). Nine positions will be required for each field code to be printed:

- (A) The Field Code (2 Columns)
- (B) Print Control (1 Column)
- (C) Left Margin (Optional) (3 Columns)
- (D) Right Margin (Optional) (3 Columns)

(A) Field Code

This is self explanatory for categorized data. If it is desired to print additional descriptive information, the letters XX are to be inserted in the first field code position (6-7) of the card. The remainder of the card from column 15 through \$ (or through column 68) will be interpreted as description.

(B) Print Control

This column governs when to print and what action is to be taken after the information identified by the related field code is processed. The following options are available:

(blank) - Insert the information.

/ - Insert the information, print, and single space.

S - Insert the information, print, and double space.

A - Insert the information, print, and go to a new page.

(C) Left Margin

The numbers (right adjusted) indicate the starting position of this print field, measured from the left margin of the page. If the specification is blank, five spaces will be inserted in the print line. If no left margin is given for the first item on the line, it will be at position 1.

(D) Right Margin

This indicates the right-most margin for printing the particular line. It is governed in all cases by the maximum margin indicated in the PRNT card. If it is blank, the number stated in the PRNT card is used.

The termination of Heading information is indicated by a card punched HEAD in columns 1-4, blank in column 5, and END in column 6-8.

3.3.3. THE LIST CARDS. These cards specify what, where, and how to print the information in the body of a report. The information need be specified for one record only. Additional records are processed in the same way.

WILLOW RUN LABORATORIES

The specifications are identical with the HEAD cards (see above), except that LIST is punched in columns 1-4 of each card instead of HEAD.

Examples of HEAD and LIST Cards

(A) Description Cards (XX in columns 6, 7)

<u>Column</u>	<u>Information</u>
1-4	HEAD (or LIST)
5	Blank
6-7	XX
8	Print control character
9-11	Indentation
12-14	Right margin
15-68	Any description; terminated by \$ or column 68.

(B) Normal Field Code Cards

<u>Column</u>	<u>Information</u>
1-4	HEAD (or LIST)
5	Blank
6-7	Field Code
8	C (Print control)
9-11	(1) Left Margin
12-14	Right Margin
15-16	Field Code
17	C (Print control)
18-20	(2) Left Margin
21-23	Right Margin
.	.
.	.
.	.
60-61	Field Code
62	C (Print control)
63-65	(6) Left Margin
66-68	Right Margin

Provision is made in the system for omission of the search, sort, or print phases of the operations. SRCH, SORT, or PRNT control cards with OMIT punched in column 6-9 should be inserted at the proper position in the request.

WILLOW RUN LABORATORIES

4 FILE MAINTENANCE

To maintain an up-to-date file, provisions must be made for additions, deletions, and changes to existing cases. Elaborate procedures might be devised for making changes to a particular field on a particular case. However, the technique developed at IST for updating is simple, straightforward, and direct.

At the time the card identification codes for the original data are set up, a special code to be subsequently used for deletions is defined. A related field code will be assigned to this card type and will be kept with the field description cards for the particular user.

Changes or additions are prepared by punching the complete case. Deletions are indicated by punching the "case" number on one card which has the card code for deletions in the card type field.

A change tape is then prepared using the same file conversion program and control cards used to prepare the original tape. Both tapes must be in the same sequential "case" number order.

The file maintenance program will compare the original with the change tape and create a new, updated tape. Card input to this program consists of:

- (A) Field Code for "case" number
- (B) Width of "case" number field
- (C) Field Code signifying record deletion

5 AN INFORMATION RETRIEVAL EXAMPLE

5.1. DEFINITION OF INFORMATION, CARD LOCATION, AND FIELD CODES

Information	Card Number	Location	Field Code	Width of Field
Case Number	All Cards	9-10	06	2
Card Code	All Cards	14-15	*	2
Continuation #	All Cards	19-20	*	2
Project	01	26-30	01	5 (right adjusted)
Date	01	33-40	02	8 (right adjusted)
Company	01	41-72	03	32
Author(s)	02	21-80	04	60 (left adjusted, blocked)
Title	03	41-60	05	20

* No field code is defined for card code and continuation numbers.

5.2. A DESCRIPTION OF THE SEARCH REQUEST (see p. 15)

(A) Search Card

The search request indicates field code 05 is to be completely scanned and any case with the word "IS" in the title is to be selected. Note that the complete word "IS" is specified by placing blanks before and after the word.

(B) SORT Card

The sort is by field code 02 (date) starting with position 7 for two columns (7-8). Thus, the sort is by year only.

(C) ALSO Card

The word ALL in column 6-8 indicates the complete record is to be included in the sorted output.

(D) The Print Card

The page width will be 80 characters. Carriage spacing at the bottom of the page will be based on a record, not a line. After a record is printed, a double space will be inserted. The title "INFORMATION RETRIEVAL EXAMPLE" will appear with the listing of the control cards.

(E) HEAD or LIST

There are no headings to appear at the top of each page—hence, no HEAD cards are present.

The first two LIST cards govern the printing of the case number. The next LIST card will print field codes 01, 02, and 03 with five spaces between the items followed by a double space. The next two LIST cards govern the printing of the authors. Since 20 positions are allowed for each name, it is considered a blocked field. By restricting the print area from column 15 to column 34, one name per line is assured.

The following two LIST cards govern the printing of the title and, finally, the LIST END card terminates the list request.

Listings of the input data cards, the specification control cards used to create the tape, the data on tape after conversion program, a completed search request form and the output showing request specifications and the retrieved data are to be found in the following pages.

WILLOW RUN LABORATORIES

5.3. A LIST OF THE INPUT DATA CARDS

Case	Card Type	Continuation
01	01	01 12345 07/01/65 UNIVERSITY OF MICHIGAN
01	02	01 JONES SMITH ABBOTT
01	02	02 BAKER WALTERS
01	03	01 THIS TITLE IS MERELY
01	03	02 AN ATTEMPT TO CHECK
01	03	03 THE SCANNING MECHAN
01	03	04 ISM
02	01	01 76283 09/13/32 FORD MOTOR COMPANY
02	02	01 ABLE BAKER SMITH
02	03	01 IRRELEVANT TITLE
03	01	01 00456 06/31/63 AMERICAN MOTORS
03	02	01 WALTERS JONES
03	03	01 THE DATE USED ON THI
03	03	02 S CASE IS AN IMPOSSI
03	03	03 BLE ONE.
04	01	01 16723 08/12/16 FORD MOTOR COMPANY
04	02	01 ABBOT
04	03	01 THIS IS THE FINAL TE
04	03	02 ST CASE OF THE SERIE
04	03	03 S.

WILLOW RUN LABORATORIES

5.4. A LIST OF THE SPECIFICATION CONTROL CARDS

ID Card	1HDR	080965	TEST	INFORMATION RETRIEVAL EXAMPLE
Group Control	5309002014002			
Field Description	C	06009020	IDENTIFICATION	
	F01	01026050	PROJECT NUMBER	
	F01	02033080	DATE	
	F01	03041320	COMPANY	
	F02	04021601	AUTHOR(S)	
End Card	F03	05041201	TITLE	
	E1			

5.5. DATA ON TAPE AFTER CONVERSION PROGRAM

1HDR	080965	TEST	INFORMATION RETRIEVAL EXAMPLE	L
11				
11				
0601	0112345	0207/01/65	03UNIVERSITY OF MICHIGAN	04JONES
ABBOTT		BAKER	WALTERS	11
RELY AN ATTEMPT TO CHECK THE SCANNING MECHANISM				
3602	0176283	0209/13/32	03FORD MOTOR COMPANY	04ABLE
SMITH		05IRRELEVANT TITLE	11	
3603	0100456	0206/31/63	03AMERICAN MOTORS	04WALTERS
05THE DATE USED ON THIS CASE IS AN IMPOSSIBLE ONE.				
0604	0116723	0208/12/16	03FORD MOTOR COMPANY	04ABBOT
11		05THIS IS THE FINAL TEST CASE OF THE SERIES.		11
1EOF				
11				

Field Codes (followed by related data)

5.6. A COMPLETED SEARCH REQUEST FORM

INFORMATION REQUEST NUMBER 1 Kirk rept. Comp. tape 684
PROJECT 9143

10	20	30	40	50	60	70
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	32	33	34	35
36	37	38	39	40	41	42
43	44	45	46	47	48	49
50	51	52	53	54	55	56
57	58	59	60	61	62	63
64	65	66	67	68	69	70
71	72	73	74	75	76	77
78	79	80	81	82	83	84
85	86	87	88	89	90	91
92	93	94	95	96	97	98
99	100	101	102	103	104	105
106	107	108	109	110	111	112
113	114	115	116	117	118	119
120	121	122	123	124	125	126
127	128	129	130	131	132	133
134	135	136	137	138	139	140
141	142	143	144	145	146	147
148	149	150	151	152	153	154
155	156	157	158	159	160	161
162	163	164	165	166	167	168
169	170	171	172	173	174	175
176	177	178	179	180	181	182
183	184	185	186	187	188	189
190	191	192	193	194	195	196
197	198	199	200	201	202	203
204	205	206	207	208	209	210
211	212	213	214	215	216	217
218	219	220	221	222	223	224
225	226	227	228	229	230	231
232	233	234	235	236	237	238
239	240	241	242	243	244	245
246	247	248	249	250	251	252
253	254	255	256	257	258	259
260	261	262	263	264	265	266
267	268	269	270	271	272	273
274	275	276	277	278	279	280
281	282	283	284	285	286	287
288	289	290	291	292	293	294
295	296	297	298	299	300	301
302	303	304	305	306	307	308
309	310	311	312	313	314	315
316	317	318	319	320	321	322
323	324	325	326	327	328	329
330	331	332	333	334	335	336
337	338	339	340	341	342	343
344	345	346	347	348	349	350
351	352	353	354	355	356	357
358	359	360	361	362	363	364
365	366	367	368	369	370	371
372	373	374	375	376	377	378
379	380	381	382	383	384	385
386	387	388	389	390	391	392
393	394	395	396	397	398	399
400	401	402	403	404	405	406
407	408	409	410	411	412	413
414	415	416	417	418	419	420
421	422	423	424	425	426	427
428	429	430	431	432	433	434
435	436	437	438	439	440	441
442	443	444	445	446	447	448
449	450	451	452	453	454	455
456	457	458	459	460	461	462
463	464	465	466	467	468	469
470	471	472	473	474	475	476
477	478	479	480	481	482	483
484	485	486	487	488	489	490
491	492	493	494	495	496	497
498	499	500	501	502	503	504
505	506	507	508	509	510	511
512	513	514	515	516	517	518
519	520	521	522	523	524	525
526	527	528	529	530	531	532
533	534	535	536	537	538	539
540	541	542	543	544	545	546
547	548	549	550	551	552	553
554	555	556	557	558	559	560
561	562	563	564	565	566	567
568	569	570	571	572	573	574
575	576	577	578	579	580	581
582	583	584	585	586	587	588
589	590	591	592	593	594	595
596	597	598	599	600	601	602
603	604	605	606	607	608	609
610	611	612	613	614	615	616
617	618	619	620	621	622	623
624	625	626	627	628	629	630
631	632	633	634	635	636	637
638	639	640	641	642	643	644
645	646	647	648	649	650	651
652	653	654	655	656	657	658
659	660	661	662	663	664	665
666	667	668	669	670	671	672
673	674	675	676	677	678	679
680	681	682	683	684	685	686
687	688	689	690	691	692	693
694	695	696	697	698	699	700
701	702	703	704	705	706	707
708	709	710	711	712	713	714
715	716	717	718	719	720	721
722	723	724	725	726	727	728
729	730	731	732	733	734	735
736	737	738	739	740	741	742
743	744	745	746	747	748	749
750	751	752	753	754	755	756
757	758	759	760	761	762	763
764	765	766	767	768	769	770
771	772	773	774	775	776	777
778	779	780	781	782	783	784
785	786	787	788	789	790	791
792	793	794	795	796	797	798
799	800	801	802	803	804	805
806	807	808	809	810	811	812
813	814	815	816	817	818	819
820	821	822	823	824	825	826
827	828	829	830	831	832	833
834	835	836	837	838	839	840
841	842	843	844	845	846	847
848	849	850	851	852	853	854
855	856	857	858	859	860	861
862	863	864	865	866	867	868
869	870	871	872	873	874	875
876	877	878	879	880	881	882
883	884	885	886	887	888	889
890	891	892	893	894	895	896
897	898	899	900	901	902	903
904	905	906	907	908	909	910
911	912	913	914	915	916	917
918	919	920	921	922	923	924
925	926	927	928	929	930	931
932	933	934	935	936	937	938
939	940	941	942	943	944	945
946	947	948	949	950	951	952
953	954	955	956	957	958	959
960	961	962	963	964	965	966
967	968	969	970	971	972	973
974	975	976	977	978	979	980
981	982	983	984	985	986	987
988	989	990	991	992	993	994
995	996	997	998	999	1000	1001
1002	1003	1004	1005	1006	1007	1008
1009	1010	1011	1012	1013	1014	1015
1016	1017	1018	1019	1020	1021	1022
1023	1024	1025	1026	1027	1028	1029
1030	1031	1032	1033	1034	1035	1036
1037	1038	1039	1040	1041	1042	1043
1044	1045	1046	1047	1048	1049	1050
1051	1052	1053	1054	1055	1056	1057
1058	1059	1060	1061	1062	1063	1064
1065	1066	1067	1068	1069	1070	1071
1072	1073	1074	1075	1076	1077	1078
1079	1080	1081	1082	1083	1084	1085
1086	1087	1088	1089	1090	1091	1092
1093	1094	1095	1096	1097	1098	1099
1100	1101	1102	1103	1104	1105	1106
1107	1108	1109	1110	1111	1112	1113
1114	1115	1116	1117	1118	1119	1120
1121	1122	1123	1124	1125	1126	1127
1128	1129	1130	1131	1132	1133	1134
1135	1136	1137	1138	1139	1140	1141
1142	1143	1144	1145	1146	1147	1148
1149	1150	1151	1152	1153	1154	1155
1156	1157	1158	1159	1160	1161	1162
1163	1164	1165	1166	1167	1168	1169
1170	1171	1172	1173	1174	1175	1176
1177	1178	1179	1180	1181	1182	1183
1184	1185	1186	1187	1188	1189	1190
1191	1192	1193	1194	1195	1196	1197
1198	1199	1200	1201</			

WILLOW RUN LABORATORIES

5.7. FIRST PAGE OF OUTPUT SHOWING REQUEST SPECIFICATIONS

I.D. INFORMATION RETRIEVAL REQUEST NUMBER 1 KIRK COMP. 684 9143

SEARCH CONTROL { SRCH \$S05\$ IS \$
 { SRCH END

SORT CONTROL { SORT 020702
 { ALSO ALL

INFORMATION RETRIEVAL EXAMPLE

PRINT CONTROL { NUMBER OF COLUMNS = 080
 { LINE OVERFLOW = N
 { RECORD OVERFLOW = Y
 { END OF RECORD CARRIAGE CONTROL = K

HEADING { HEADING CONTROL
 { F.C. P LMAR RMAR HOLLERITH
 { NO HEADING CONTROL

LIST SPECIFICATIONS { LIST CONTROL
 { F.C. P LMAR RMAR HOLLERITH
 { XX / 010 THIS IS CASE \$
 { 06 S 023
 { 01
 { 02
 { 03 S
 { XX / 010 THE AUTHORS ARE \$
 { 04 / 015 034
 { XX / 010 THE TITLE IS \$
 { 05 / 015
 { END

WILLOW RUN LABORATORIES

5.8. RETRIEVED DATA

THIS IS CASE 04

16723 08/12/16 FORD MOTOR COMPANY

THE AUTHORS ARE
ABBOT

THE TITLE IS
THIS IS THE FINAL TEST CASE OF THE SERIES.

THIS IS CASE 03

00456 06/31/63 AMERICAN MOTORS

THE AUTHORS ARE
WALTERS
JONES

THE TITLE IS
THE DATE USED ON THIS CASE IS AN IMPOSSIBLE ONE.

THIS IS CASE 01

12345 07/01/65 UNIVERSITY OF MICHIGAN

THE AUTHORS ARE
JONES
SMITH
ABBOTT
BAKER
WALTERS

THE TITLE IS
THIS TITLE IS MERELY AN ATTEMPT TO CHECK THE SCANNING MECHANISM

APPENDIX D

IRIA FILE STRUCTURES

D-1

INTRODUCTION

IRIA data files are maintained on three tapes: IRIA-Number IRIA-Master, Category-Number IRIA Master, and Category-Number IRIA-Annotation. The structure of the Master File is shown in Appendix D-1. The Annotation File structure is shown in Appendix D-2.

Creating a file requires the necessary control cards to define the tape file and fields. These are shown, along with sample data inputs and the tape file format that results from the three IRIA files, in Appendix D-3 through D-10.

IRIA Category Numbers are maintained on punched cards in the Category Heading File. When the file is used in the program, it is first loaded onto a disk pack. The file format is as follows:

<u>Description</u>	<u>Field Code</u>	<u>Width of Field</u>	<u>Columns</u>
Expanded Category Number and Meaning	01	60	1-60
Category Number	28	3	65-67
Expanded Category Number	02	8	71-78

D-1 (Continued)

IRIA Master File

<u>Contents</u>	<u>Field Code</u>	<u>Width of Field</u>	<u>(Column 76) Card Type</u>	<u>Columns</u>
IRIA Serial Code	03	5	All Cards	71-75
Month Introduced	09	1	All Cards	80
Title	01	50 (Multiple)	1	7-51 ¹
Confidential Title	37	50 (Multiple)	A	7-51 ¹
Security Classification	02	15	2	7-21
Contractor	04	50 (Multiple)	3	7-51 ¹
Report Number	05	50 (Multiple)	4	7-51 ¹
Date	06	20	5	7-26
Contract Number	07	25 (Multiple)	6	7-31
Astia Number	08	11	7	7-17
Command (DELETE or MODIFY punched in 7-12 & 13-16 blank)	35	10	+	7-16
Contractor Code	29	4	9	24-27
Contract Number	10	5	9	28-32
Department Service Code	11	1	9	33
Sponsoring Agency	12	4	9	34-37
Month of Publication	31	1	9	38
Year of Publication	13	2	9	39-40
Journal	14	4	9	41-44
1 st Author Code	15	4	9	45-48
Abstract Number	16	9	9	53-61
Language Code	17	1	9	62
Bamirac Serial	19	7	9	63-69
Security Code	20	1	9	80
1 st Category Word	21	4	9	1-4
2 nd Category Word	22	4	9	5-8
3 rd Category Word	23	4	9	9-12

¹ Columns 52-56 must be blank for photographic reduction for publications.

D-1
(Continued)

<u>Contents</u>	<u>Field Code</u>	<u>Width of Field</u>	<u>Card Type</u>	<u>Columns</u>
Evaluation Code	24	1	9	13
Type of Report	25	1	9	14
3 rd Category Number	26	3	9	15-17
2 nd Category Number	27	3	9	18-20
1 st Category Number	28	3	9	21-23
(*) = All Category Words blank	30 ¹	1	—	—
(M) = Modify (D) = Delete (-) = New	32 ¹	1	—	—
(*) = Unpublished in Quarterly	33 ¹	1	—	—
(*) = Unpublished in Annual	34 ¹	1	—	—
Error Message	36 ¹	Var	—	—
New 1 st Category Number	38 ¹	3	—	—

After the updating of the files is complete, field codes 35, 36, and 38 are not in file. Also, field code 32 only contains a (D) in the IRIA-NUMBER IRIA-MASTER file and this is removed after the CATEGORY-NUMBER IRIA-MASTER is updated.

¹ Computer generated field codes.

D-2

IRIA Annotation File

file follows:

<u>Contents</u>	<u>Field Code</u>	<u>Width of Field</u>	<u>(Column 76) Card Type</u>	<u>Columns</u>
IRIA Serial Code	01	5	All Cards	71-75
Expanded 1 st Category Number	02	6	8	65-70
Annotation	03	50 (Multiple)	8	7-51 ¹
Command (DELETE or MODIFY punched in 7-12 & 13-16 blank)	35	10	+	7-16
(*) = New (F) = Flag (!) = Modify	32 ²	1	-	---
(*) = Unpublished Quarterly	33 ²	1	-	---
(*) = Unpublished Annual	34 ²	1	-	---
1 st Category Number	23 ²	3	-	---
Error Message	36 ²	Var.	-	---

Attached to this memo are a listing of the file conversion control cards,
a listing of some detail cards, and a listing of the tape records created by
the file conversion program.

¹ Columns 52-56 must be blank for photographic reduction for publications.

² Computer generated field codes.

A. File Conversion Control Cards for Creating A IRIA-MASTER Tape

1001	592564	IRIA	IRIA	MASTER AND FULL LIBRARY FILE.	PL
1002	007100	007600			
1003	007100				
1004	007600				
1005	01007501			IRIA SERIAL CODE	
1006	01007501			MONTH OCCURRENCE INTRODUCED INFO SYSTEM	
1007	0200715			TITLE	
1008	04007501			CONFIDENTIAL TITLE	
1009	05007501			SECURITY CLASSIFICATION	
1010	06007501			CONTRACTOR	
1011	0600720			REPORT NUMBER	
1012	07007251			DATE	
1013	0800711			CONTRACT NUMBER	
1014	0900710			ASST. NUMBER	
1015	20022404			COMMAND CODE, MODIFY	
1016	1102305			CONTRACT CODE	
1017	1103301			CONTRACT NUMBER	
1018	1203404			SEPARATE IF SERVICE CODE	
1019	3103201			SPONSORING AGENCY	
1020	1303902			MONTH	
1021	1404104			YEAR	
1022	1504504			JOURNAL	
1023	1505309			1 ST AUTHOR CODE	
1024	1706201			ABSTRACT NUMBER	
1025	1906307			LANGUAGE CODE	
1026	2008001			ABSTRACT SERIAL CODE	
1027	2100104			SECURITY CODE	
1028	2200504			1 ST CATEGORY WORD	
1029	2300904			2 ND CATEGORY WORD	
1030	2401301			3 RD CATEGORY WORD	
1031	2501601			EVALUATION CODE	
1032	2601903			TYPE OF REPORT	
1033	2701303			1 ST CATEGORY WORD	
1034	2801703			2 ND CATEGORY WORD	
1035	2902103			3 RD CATEGORY WORD	
1036					

10040	TRANSMISSION OF THE ATMOSPHERE IN THE INFRARED	62	03030010040101293
	A REVIEW	62	0303001004010293
	UNCLASSIFIED	62	0303001004020193
	AIR FORCE CAMBRIDGE RESEARCH LABS., BEDFORD, MASS.	62	0303001004030103
	RESEARCH REPORT NO. 150, AFRL-62-814	62	0303001004040103
	JULY 1962	62	0303001004050103
	NO CONTRACT NUMBER	62	0303001004060103
	AD 289 539	62	0303001004070103
ATND	23 330CRA 30CA722 JH0RJCA2X40235539		0100409 1
10043	INVESTIGATION OF THE INFRARED ABSORPTION		0704021004031015
	SPECTRA OF SELECTED AROMATIC COMPOUNDS		0704021004041025
	UNCLASSIFIED		0704021004052015
	BATTELLE MEMORIAL INST., COLUMBUS, O.		0704021004063025
	TECHNICAL DOCUMENTARY REPORT NO. ASD TR 71-722		0704021004074035
	MARCH 1962		0704021004085045
	AF 33(616)-7102		0704021004096055
	AD 276 413		0704021004107065
SPTR	20 0307420101010220ARC362 RJAK XAP276613		0100409 1
10044	I. RESEARCH CONCERNING INFRARED EMISSIVITY		0303001004041010
	II. AIRBORNE OPTICAL NOISE MEASUREMENTS		0303001004041020
	UNCLASSIFIED		0303001004042010
	SYRACUSE UNIVERSITY, SYRACUSE, N. Y.		0303001004043025
	FINAL REPORT AFRL-62-869		0303001004044035
	AUGUST 1962		0303001004045045
	AF 19(664)-2000		0303001004046055
	AD 297 517		0303001004047065
ERS	14 4203210V30130130CA862 30A00111X402300517		0100409 1

C. Tape Records After File Converting Sample
of IRIA Master and Bibliography Cards

1HDK
1+

092564IRIA BIHL IRIA MASTER AND BIBLIOGRAPHY FILE.

+ L

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0310040+093+01TRANSMISSION OF THE ATMOSPHERE IN THE INFRARED. A REVIEW

ORT NO. 150, AFCRL-62-814 +02UNCLASSIFIED +04AIR FORCE CAMBRIDGE RESEARCH LABS., BEDFORD, MASS.+05RESEARCH REP
30 +29CRCA+10 +113+12CRCA+317+1362+14 +06JULY 1962 +07NO CONTRACT NUMBER +08AD 287 5
+242+253+26 +27 +28330+)) +15JHNL+16XAD27517117 +19 +201+21ATM+22 +23

0310043+09

+01INVESTIGATION OF THE INFRARED ABSORPTION

DS +02UNCLASSIFIED +04BATTILLE MEMORIAL INST., COLUMBUS, O. SPECTRA OF SELECTED AROMATIC COMPOUN
COMMENTARY REPORT NO. ASD TR 61-722 +06MARCH 1962 +07AF 33(616)-7162 +08AD 275 4
13 +29RIMI+1007162+113+12HADG+313+1362+14 +15RJAK+16XAD275413+17 +19 +201+21SPIR+22 +23
+242+250+26 +27830+28742+))

0310044+09

+01. RESEARCH CONCERNING INFRARED EMISSIVITY

REMENTS +02UNCLASSIFIED +04SYRACUSE UNIVERSITY, SYRACUSE, N. Y. II. ATMOSPHERIC OPTICAL JOISE REASO
AFCRL-62-869 +06AUGUST 1962 +07AF 19(604)-3908 +08AD 287 5
17 +29SYRU+1003908+113+12CRCA+314+1362+14 +15RPAU+16XAD27517117 +19 +201+21EM5V+22 +23
+241+254+26 +27420+28330+))

)))

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1+

D. Tape Records as They Appear On IRIA-NUMBER IRIA-MASTER Tape

INDR IRIA MASTR

*)+

0310040+28330+27 +26 +21ATMO+22 +23 +30 +242+12CRCA+1362+15JHOW+201+29CRCA+317+32 +33 +34
 +10 #16XAD289530+253+113+14 +17 +19 +02UNCLASSIFIED 1993+04AIR FORCE CAMBRIDGE RESEAR
 CH LABS., BEDFORD, MASS.+05RESEARCH REPORT NO. 150, AFRL-62-814 #06JULY 1962
 +07NO CONTRACT NUMBER +08AD 289 530 +01TRANSMISSION OF THE ATMOSPHERE IN THE INFRARED-- A REV
 IEW +11+

0310043+28742+27830+26 +21SPTR+22 +23 +30 +242+12WADG+1362+15RJAK+201+29BTMI+313+32 +33 +34
 +1007162+16XAD276413+250+113+14 +17 +19 +01INVESTIGATION OF THE INFRARED ABSORPTION
 SPECTRA OF SELECTED AROMATIC COMPOUNDS +02UNCLASSIFIED 199 +04BATTLE MEMORIAL INST.
 COLUMBUS, O. +03TECHNICAL DOCUMENTARY REPORT NO. RSC IR 61-722 +06MARCH 1962
 +07AF 33(616)-7162 +11+

D-6

0310044+28330+27420+26 +21EPSN+22 +23 +30 +241+12CRCA+1362+15APAU+201+29SYRU+313+32 +33 +34
 +1003950+16XAD287517+254+113+14 +17 +19 +011. RESEARCH CONCERNING INFRARED EMISSIVITY
 II. ATMOSPHERIC OPTICAL NOISE MEASUREMENTS +02UNCLASSIFIED 1 9 +04SYRACUSE UNIVERSITY, SY
 RACUSE, N. Y. +05FINAL REPORT AFRL-62-869 #06AUGUST 1962
 +07AF 19(604)-3903 +11+

11+

E. Tape Records as They Appear On CATEGORY-NUMBER IRIA-MASTER Tape

IRIA MASTR #11

0310040+28330+27 #26 #21ATM0+22 #23 #30 #242+12CRCA+1362+15JHOM+201+29CNC+317+32 #33 #34
 #10 #16XAD289530+253+113+14 #17 #19 #20UNCLASSIFIED #293104AIR FORCE CAMBRIDGE RESEAR
 CH LABS., BEDFORD, MASS. #05RESEARCH REPORT NO. 150, AFRL-62-014 #06JULY 1962
 #07NO CONTRACT NUMBER #08AD 289 530 #01TRANSMISSION OF THE ATMOSPHERE IN THE INFRARED-- A REV
 IEW #11

0310044+28330+27420+26 #21ENSN+22 #23 #30 #241+12CRCA+1362+15RPAH+201+29SYRU+316+32 #33 #34
 #100300816XAD287517+254+113+14 #17 #19 #20UNCLASSIFIED #29 1.4SYRACUSE UNIVERSITY, NY
 II. ATMOSPHERIC OPTICAL NOISE MEASUREMENTS #20UNCLASSIFIED #29 1.4SYRACUSE UNIVERSITY, NY
 RACUSE, N. Y. #05FINAL REPORT AFRL-62-069 #26AUGUST 1962
 #07AF 19(604)-3903 #08AD 287 517 #11

0310043+28742+27830+26 #21SPTR+22 #23 #30 #242+12RAC+1362+15RJAR+201+29PINT+313+32 #33 #34
 #1007162+16XAD276413+250+113+14 #17 #19 #20INVESTIGATION OF THE INFRARED ABSORPTION
 SPECTRA OF SELECTED AROMATIC COMPOUNDS #20UNCLASSIFIED #29 1.4PATRICK HENRIAL INST.
 , COLUMBUS, O. #05TECHNICAL DOCUMENTARY REPORT NO. ASD TR 61-722 #06MARCH 1962
 #07AF 33(616)-7162 #08AD 276 413 #11

#11

F. File Conversion Control Cards for Creating A IRIA-ANNOTATION Tape

```

IHUR      092564IRIA ANNOTIRIA ANNOTATIONS IN 1 ST CATEGORY NUMBER ORDER  + L
5071005076001
C      0107105
T8      0206506
T8      0300701
T+      3500710
EI

```

IRIA SERIAL CODE
EXPANDED 1 ST CATEGORY NUMBER
ANNOTATION
COMMAND DELETE OR MODIFY

G. Sample of IRIA Annotation Cards

A 20-PAGE REPORT DISCUSSING RECENT TECHNIQUES DEVELOPED TO CALCULATE THE INFRARED SLANT-PATH TRANSMISSION. ENOUGH DATA AND FIGURES ARE GIVEN TO PERFORM APPROXIMATE CALCULATIONS. INVESTIGATES METHOD OF ANALYZING NATURE OF SUBSTITUENTS ON BENZENE RINGS BY MEANS OF LOW-FREQUENCY IR ABSORPTION. THIS REPORT IS CONCERNED WITH CONTRAST WASHOUT OF TERRAIN OBJECTS UNDER CERTAIN CONDITIONS, AND WITH SCATTERILLATION EFFECTS IN ATMOSPHERIC TRANSMISSION, WHICH WERE FOUND TO BE LARGELY INTENSITY VARIATIONS.

```

62 0303001004080105
62 0303001004080205
62 0303001004080305
62 0303001004080405
   0704021004360102
   0704021004380202
   0704021004390302
   0303001004400102
   0303001004400202
   0303001004400302
   0303001004400402
   0303001004400502

```

II. Tape Records After File Converting Sample of IRIA Annotation Cards

1HDR	092564	IRIA	ANNOTATIONS IN 1 ST CATEGORY NUMBER ORDER	* L
))				
))				
0110040	02030300	03A	20-PAGE REPORT DISCUSSING RECENT TECHNIQUES DEVELOPED TO CALCULATE THE INDEX	
ARED SLANT	PATH		TRANSMISSION. ENOUGH DATA AND FIGURES ARE GIVEN TO PERFORM APPROXIMATE CALCULAT	
IONS.				
0110043	02070402	031	INVESTIGATES METHOD OF ANALYZING NATURE OF SUBSTITUENTS ON BENZENE RINGS	
Y MEANS OF LOW-			FREQUENCY IR ABSORPTION.	
0110044	02030300	031	THIS REPORT IS CONCERNED WITH CONTRAST WASHOUT OF CERTAIN OBJECTS UNDER CERTAIN	
N CONDITIONS,			AND WITH SCATTERING EFFECTS IN ATMOSPHERIC TRANSMISSION, WHICH WERE FOUND	
TO BE LARGELY			INTENSITY VARIATIONS.	
))				
1EOF				
))				

I. Tape Records As They Appear On CATEGORY-NUMBER IRIA-ANNOTATION Tape

1HDR

ANNOI

*)†

)))

0110043+28330+32 +33 +34 +0110040+02030300+C3A 20-PAGE REPORT DISCUSSING RECENT TECHNIQUES OF TERRAIN OB
OPER TO CALCULATE THE INFRARED SLANT-PATH TRANSMISSION. ENOUGH DATA AND FIGURES ARE GIVEN TO PE
REFORM APPROXIMATE CALCULATIONS. *)†

0110044+28330+32 +33 +34 +02030300+C3THIS REPORT IS CONCERNED WITH CONTRAST WASHOUT OF TERRAIN OB
JECTS UNDER CERTAIN CONDITIONS, AND WITH SCINTILLATION EFFECTS IN ATMOSPHERIC TRANSMISSION.
WHICH WERE FOUND TO BE LARGELY INTENSITY VARIATIONS. *)†

0110043+29742+32 +33 +34 +0110043+C2070402+03INVESTIGATES METHOD OF ANALYZING NATURE OF SUBST
ITUENTS ON BENZENE RINGS BY MEANS OF LOW-FREQUENCY IR ABSORPTION. *)†

)))

APPENDIX E

IRIA FILE UPDATING RUNS

INTRODUCTION

Information in Appendix E is extracted from the following memoranda by L. Launstein, dated October 13, 1965, written to the IRIA File:

1. How to Update IRIA-Number IRIA-Master Tape
2. How to Update the Category-Number IRIA-Master Tape
3. How to Update the Category-Number IRIA-Annotation Tape

How to Update IRIA-Number IRIA-Master Tape

Preparation of Cards

The cards required to enter the information for a new document, modify information for an old document, and delete the information for an old document are discussed below. The descriptions of the bibliography and master cards are given in the "Definitions of IRIA Files for Computer Processing." Note that the information from the annotation cards is not in the IRIA-Master files.

To Enter Information for a New Document

The card types, 1, A, 2, 3, 4, 5, 6, 7, and 9 are used to enter information for a new document. Any other card type, except a type 1 card, will be listed as an unused card. The type "+" card will be caught when it tries to enter the file. This will cause the record to be listed in the error record listing with the comment "NO RECORD FILE TO" at the top and the contents of columns 7-16 of card type 1 at the bottom.

If card types 1, 2, 3, 4, 5, and 6 are not all present, the record will be listed in the error records with "MISSING FIELD" printed above the record. Depending on which field is missing, one of the comments

"** TITLE," "** CLASSIFICATION," "** CORP AUTHOR," "** REPORT NO.," "** DATE," or "** CONTRACT NO." will be printed in place of the missing field.

To Modify the Information for an Old Document

The particular card type to be modified or added is punched in its entirety. A type "+" card must be present with the characters "MODIFY" punched in columns 7-12. Otherwise, the record will be listed in the error record listing with the comment "ERRONEOUS ADDITION RECORD. RECORD OF SAME IRIA NUMBER LEFT IN FILE UNCHANGED."

Type "+" card is not needed for a type "9" card with a non-blank first category number to modify a record that is already there, provided the old record didn't contain a non-blank first category number. Although, a type "+" card being present is not an error.

A type "9" card with a new first category number and a type "+" card with the characters "MODIFY" punched in 7-12 will change the master information on the IRIA-MASTER tapes, will reposition the modified record on the CAT-NUMBER IRIA-MASTER tape and will change the first category number and reposition the annotation on the CAT-NUMBER IRIA-ANNOTATION tape. The last two are completed at the time the CAT-NUMBER IRIA-MASTER tape is updated.

To Delete the Information for an Old Document

To delete the information for an old document a type "+" card is punched with the characters "DELETE" punched in columns 7-12. This one card deletes the record from the IRIA-NUMBER IRIA-MASTER tape. When the CAT-NUMBER IRIA-MASTER tape is updated, the record is also deleted from that tape and from the CAT-NUMBER IRIA-ANNOTATION tape.

Comments

If a type "+" card has anything other than "DELETE" or "MODIFY" punched in columns 7-12, the record will be listed in the error records with the comment "ERRONEOUS ADDITION RECORD. RECORD OF SAME IRIA NUMBER LEFT IN FILE UNCHANGED." The contents of columns 7-16 will also be listed.

Any record that is modified is not checked for the presence of field codes 01, 02, 03, 04, 05, 06, and 07. Therefore, a bibliography that is added for an old master card can enter the file with one of the above field codes missing.

The field code 10 is not present in the maintained files. The computer program generates the field code 32 with a "D" for "DELETE" an "M" for "MODIFY", or a "*" for a new document. When a new document enters

the file, the field codes 33 and 34 are also generated with an "*" in them.

Whenever the first category word is the same as the third category word, the computer program generates a field code 30 with an "*" in it. Otherwise, the field code 30 contains a blank. Therefore, a "*" in field code 30 signifies that all category words are blank.

Until the CAT-NUMBER IRIA-MASTER tape has been updated, the IRIA-NUMBER IRIA-MASTER tape contains any records that are to be deleted with a "D" in field code 32. Also, whenever the first category number of a record changes, a record is generated consisting of the old fast search field codes, a field code 38 containing the new first category number, and a "D" in field code 32.

If the number of characters for one document exceeds 1000, the cards containing the unused information are listed. Any "4-8" punches in the fields of field codes 01, 04, 05, or 07 are converted to "-" punches.

Preparation of the Update Deck

All cards for the update run are placed together. The cards for any one document (IRIA number) must be together. Any continuation cards must be in sequence.

Updating of the IRIA-NUMBER IRIA-MASTER Tape

The update deck is used as input to the WR-128 program. The output from the program is a listing of the records that entered the tape, a listing of the records that didn't enter the tape, and a tape reflecting the new additions, modifications, deletions, and old IRIA-NUMBER IRIA-MASTER tape.

2. How to Update the Category-Number IRIA-Master Tape

The CAT-NUMBER IRIA-MASTER tape is updated by requesting program WR-129 to be run. The program needs no input cards. The program searches the new additions, modifications, and deletions from the IRIA-NUMBER IRIA-MASTER by pulling all records with the field of field code 32 and the field of field code 28 non-blank. The pulled records are then sorted into first category number order. Then the CAT-NUMBER IRIA-MASTER tape is updated.

If any records were deleted or had first category number changes, the annotations are pulled from the CAT-NUMBER IRIA-ANNOTATION, modified, and used to update the CAT-NUMBER IRIA-ANNOTATION tape.

The output consists of a listing of the records entered on the CAT-NUMBER IRIA-MASTER tape and on the CAT-NUMBER IRIA-ANNOTATION tape, plus the new up to date tapes.

3. How to Update the Category-Number IRIA-Annotation Tape

Preparation of Cards

Only the annotation cards (type "8" cards) are needed to enter a new annotation.

To modify an annotation already on tape, the annotation cards (type "8" cards) and the type "+" card with the characters "MODIFY" punched in columns 7-12 are needed.

To delete an annotation from the tape, a type "+" card may be used. However, the deletion of the bibliography also deletes the annotation.

Preparation of the Update Deck

The annotation cards with any type "+" card are put together. The annotation cards must be in continuous sequence for each document (IRIA number). Also, any type "+" cards must be with any annotation cards for a document.

Updating of the CAT-NUMBER IRIA-ANNOTATION Tape

The WR-130 program is used to update the CAT-NUMBER IRIA ANNOTATION tape. The program uses the update deck as input. The program's output is a listing of annotations that entered the CAT-NUMBER

IRIA-ANNOTATION tape plus an up to date tape. There is also a listing of the annotations that didn't enter the tape (see comments below).

Comments

If there is no first category number on the IRIA-NUMBER IRIA-MASTER tape for an annotation, the comment "NO FIRST CAT NUMBER IN IRIA MASTER FILE," and the annotation are listed in the error listing.

If any cards are present besides type "+" and "8" cards, they will be listed as unused. But at least the IRIA number will be in a record on the update tape. If the annotation is missing, the IRIA number for this document and the comment "ANNOTATION IS MISSING," will be listed in the error listing.

If anything other than "DELETE" or "MODIFY" appear in columns 7-12 of a type "+" card, the error listing will contain the comment " I CAN NOT DO THIS," the annotation, and the erroneous command.

If an annotation is over 1000 characters, the excess annotation cards are listed.

When a new annotation enters the tape, the fields of field codes 32, 33 and 34 are set to "*"s. If the command "MODIFY" is present,

E-9

the field of field code 32 contains a "M".

A program is available to flag the annotations that have had the corresponding bibliography modified. This is done by placing an "F" in the field of field code 32.

The field codes 35 and 36 are not in the maintained CAT-NUMBER IRLA-ANNOTATION tape.

APPENDIX F

IRIA QUARTERLY ANNOTATED
BIBLIOGRAPHY AND INDEX RUNS

F-1

INTRODUCTION

Appendix F is taken from a memo, "How to Produce a Quarterly Annotated Bibliography and Index," from L. Launstein to the IRIA File, dated October 14, 1965.

Before a quarterly Annotated Bibliography is printed, the CAT-NUMBER IRIA-MASTER and CAT-NUMBER IRIA-ANNOTATION tapes must be up to date. For the procedures on how to update the tapes, see the memos entitled "How to Update IRIA-NUMBER IRIA-MASTER Tape," "How to Update the CAT-NUMBER IRIA-MASTER Tape," and "How to Update the CAT-NUMBER IRIA-ANNOTATION Tape."

Printing a Quarterly Annotated Bibliography

A quarterly Annotated Bibliography is printed by requesting that the program WR-131 be run. The program pulls all of the annotations off the CAT-NUMBER IRIA-ANNOTATION tape that have an "*" in the field of field code 33. Since the field of field code 33 is cleared to a blank after printing a quarterly annotated bibliography, all of the annotations added to the tape since the last quarterly Annotated Bibliography are pulled for printing.

The program prints the bibliography and the corresponding annotation for all of the pulled annotations. Whenever the first category number changes, the first category number's meaning is looked up in a dictionary stored on a disk and printed preceding the bibliographies and annotations for that first category number.

If the program cannot find a bibliography for an annotation, the program prints "BIBLIOGRAPHY IS MISSING" and then the annotation.

If the program cannot find the meaning for a first category number, preceding the bibliographies and annotations for that first category number, the program prints "NO CAT HEADING FOR" and the first category number.

The program can print the bibliographies and annotations for all of the pulled annotations by placing an "=-E" card behind the program deck. To start printing the bibliographies and annotations at the first category number "XXX", a card with "28XXX#7" punched in columns 1-7 is placed before the "=-E" card.

Printing the Index for a Quarterly Annotated Bibliography

The Index for a Quarterly Annotated Bibliography is printed by requesting that the program WR-132 be run. The tape containing the pulled annotations used to print the Quarterly annotated bibliography is needed as input to the program.

The program sorts the pulled annotations into IRIA number order. By matching the sorted tape with the IRIA-NUMBER IRIA-MASTER tape and finding expanded first, second, and third category numbers in the disk dictionary, the index line for the document is printed.

If the program cannot find a record on the IRIA-NUMBER IRIA-MASTER tape corresponding to a record on the sorted pulled annotations tape, the

IRIA number and the comment "IS MISSING FROM IRIA-NUMBER IRIA-MASTER TAPE" are printed. If a category number is not in the disk dictionary, the program prints the non-expanded category number.

To print the index for all of the annotations on the sorted pulled annotations, the program deck ends with the "=:E" card. To start printing the index at IRIA number XXXXX, a card with "01XXXXX#/" punched in columns 1-9 is inserted before the "=:E" card.

Clearing the Field of Field Code 33

The field of field code 33 is cleared by requesting program WR-133 to be run. The program replaces any "*" 's on the CAT-NUMBER IRIA-ANNOTATION tape with blanks, so that the tape is ready for the next quarters annotations. Note that the field of field code 33 must not be cleared until the final copy of a Quarterly Annotated Bibliography has been printed. Also, all new annotations added to the tape since 33 was cleared last are printed the next time.

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R&D		
<small>(Security classification of title, body of abstract and indexing annotation must be at least as high as the overall report)</small>		
1. ORIGINATING ACTIVITY (If appropriate, include address) BOOZ ALLEN APPLIED RESEARCH, INC. 4733 Bethesda Avenue Bethesda, Maryland 20014		2. SECURITY CLASSIFICATION Unclassified
3. REPORT TITLE Mechanization Study of the VESIAC, BAMIRAC and IRIA Information Centers, University of Michigan		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates) Final Report of on-site survey		
5. AUTHOR(S) (Last name, first name, initial) G. A. Kershaw, D. Crowder, J. E. Davis, E. G. Loges, E. Merendini, S. M. Thomas		
6. REPORT DATE September, 1966	7a. TOTAL NO. OF PAGES 103	7b. NO. OF PAGES 2
8a. CONTRACT OR GRANT NO. DSA-7-15489	9a. ORIGINATOR'S REPORT NUMBER 914-1-36	
A. PROJECT NO.	9b. OTHER REPORT NUMBERS (Any other numbers that may be assigned this report) AD 640 130	
10. AVAILABILITY LIMITATION NOTICES Distribution of this Document is unlimited		
11. SUPPLEMENTARY NOTES None	12. SPONSORING MILITARY ACTIVITY Defense Supply Agency Defense Documentation Center Cameron Station, Virginia	
13. ABSTRACT Three information and analysis centers of the Institute of Science and Technology, University of Michigan, utilize the computer and EAM facilities of the Institute's Computation Department for retrieval of bibliographic references based upon the Computation Department's generalized retrieval system. The three centers are Infrared Information Analysis Center (IRIA), VELA Seismic Information Analysis Center (VESIAC), and Ballistic Missile Radiation Analysis Center (BAMIRAC). IRIA utilizes the mechanized retrieval program, which uses an IBM 1401 computer, to produce two listings. VESIAC is in the pilot stage of producing demand bibliographies using the mechanized information retrieval program. BAMIRAC utilizes an optional arrangement of manual, EAM, and mechanized techniques to provide demand bibliographies including abstracts. The development of a generalized retrieval program for all three centers has eliminated the need for the more costly process of maintaining a specialized program for each center. Because of center similarities, this general program fits each center's requirements without significant difficulty.		

Security Classification

14	KEY WORDS	LINK A		LINK B		LINK C	
		ROLE	WT	ROLE	WT	ROLE	WT
	Digital Computers Data Analysis Electronic Accounting Machines Information Retrieval						

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4. **DESCRIPTIVE NOTES:** If appropriate, enter the type of report, e.g., interim, progress, summary, annual, or final. Give the inclusion dates when a specific reporting period is covered.

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13. **ABSTRACT:** Enter an abstract giving a brief and factual summary of the document indicative of the report, even though it may also appear elsewhere in the body of the technical report. If additional space is required, a continuation sheet shall be attached.

It is highly desirable that the abstract of classified reports be unclassified. Each paragraph of the abstract shall end with an indication of the military security classification of the information in the paragraph, represented as (TS), (S), (C), or (R).

There is no limitation on the length of the abstract. However, the suggested length is from 150 to 225 words.

14. **KEY WORDS:** Key words are technically meaningful terms or short phrases that characterize a report and may be used as index entries for cataloging the report. Key words must be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location, may be used as key words but will be followed by an indication of technical context. The assignment of links, roles, and weights is optional.